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MANUAL

OF

CONCHOLOGY;

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONTINUED BY

HENRY A. PILSBRY.

Vol. X.

NERITIDÆ. ADEORBIIDÆ, CYCLOSTREMATIDÆ, LIOTIIDÆ,
BY GEO. W. TRYON JR.
PHASIANELLINÆ, TURBINIDÆ, DELPHINULINÆ.
BY HENRY A. PILSBRY.

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MANUAL OF CONCHOLOGY.

Monograph of the Families Neritidæ, Neritopsidæ, Adeorbiidæ, Cyclostrematidæ, and Liotiidæ.

Family *NERITIDÆ.*

Animal with a broad, short muzzle, and long slender tentacles, with eyes on prominent pedicels at their outer bases, foot oblong, wide in front, attenuated behind, branchia long, triangular, pointed, free at its extremity, ventricle embracing the intestine, anus on the right side.

Dentition: 8·I·(3 + I + 3)·I·8. The middle tooth small, subquadrangular, second central tooth very large, transverse, subrhomboidal, third and fourth central teeth very small; lateral tooth with reflected, simple or denticulated margin; marginal teeth numerous, narrow, curved, serrated. Pl. 1, figs. 2, 3.

Shell imperforate, thick, semiglobose, porcellanous, spire very small, internally porcellanous, the cavity simple from the absorption of the internal portion of the whorls by the animal (Pl. 1, fig. 15), aperture semilunate, entire, the columellar lip flattened, septiform, with a rectilinear, plain or dentate margin, outer lip rounded, sharp or thickened, not reflected.

The impression of the adductor muscle is horse-shoe shaped, open in front, and is visible within the aperture.

Operculum calcareous, usually subspiral, provided with projecting lobes on its inner face, the inner margin forming a pseudo-articulation with the columellar lip.

Aquatic, although some species can live out of water; herbivorous.

The Neritidæ have been monographed by:

Reeve, Conch. Icon., ix, 1855.

Sowerby, Thes. Conch. ii, and v.

Von Martens, Küster's Conchylien Cabinet, 1879, 1881, 1887.

The latter author has given for this family the most complete and carefully worked-up generic monographs that have lately appeared

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in either of the iconographies. I have, in the main, followed his arrangement of the species, although a different disposition of some of the groups has appeared to me more desirable, and has accordingly been attempted. In the Neritinæ Von Martens has made the opercular processes the basis of his classification, whilst I have considered characters of the shell as of more importance; the result is a different succession of groups, whilst their contents remain essentially alike.

Synopsis of Genera.

Genus NERITA, Adanson. 1757.

Shell thick, smooth or spirally ridged and grooved, porcellanous, under a corneous adhering epidermis—sometimes wanting; outer lip thick, usually denticulated within, columellar lip flattened, its margin dentate, straight. Operculum calcareous, the outer face granulated or with a decurrent groove, paucispiral, with excentric nucleus, inner face callous, the apical and claviform apophyses well-marked, marginal apophysis more or less developed, corresponding with the groove of the outer face.

Animal usually with festooned mantle margin. Living on rocks and stones, generally inactive by day, but said to be active at night, roaming about and feeding on algæ, etc. Gregarious, and littoral, and nearly exclusively marine.

About 200 living species have heretofore been recognized, inhabiting tropical and semitropical shores throughout the world. Sixty fossil species have been enumerated, but the earlier forms are somewhat doubtful, and may more probably be referred to Neritodomus.

Section NERITA, Lamarck. 1799 (sensu stricto).

Columellar lip granular or tuberculated. N. ALBICILLA, Linn.

Theliostyla, Mörch. 1852, and *Natere*, Gray. 1858, are synonyms.

Section PELORONTA, Oken. 1815.

Columellar lip nearly smooth, its margin strongly dentate, outer lip dentate within. N. PELORONTA, Linn.

Tenare, Gray. 1858, is a synonym.

Section PILA, Klein. 1753.

Columellar lip rugosely grooved and ridged, its edge dentate, outer lip plicate within, with a large tooth at either extremity of the series. N. PLICATA, Linn.

Ritena, Gray. 1858, is a synonym.

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Section ODONTOSTOMA (Klein. 1753), Mörch. 1852.

Columellar lip smooth or nearly smooth, its margin dentate, outer lip scarcely denticulated within. N. POLITA, Linn.

Subgenus LISSOCHILUS, Pethö. 1882.

Inner lip smooth, its margin not dentate, outer lip sharp, not thickened or dentate within. Triassic and Jurassic.
N. SIGARETINA, Buv.

Subgenus OTOSTOMA, d'Archiac. 1859.

Shell with longitudinal plications and very fine spiral lines, columellar lip thick, with dentate margin.

Cretaceous of *Europe*, *Algiers* and *Asia Minor*. N. RUGOSA, Hœningh.

These fossils have usually lost the columellar lip and the inner layer of the outer lip, but traces of these destroyed parts are found upon casts. The discovery of a silicified specimen in good preservation and intact has proven the identity of Otostoma with Nerita; its longitudinal plications will serve to distinguish it subgenerically.

Lyosoma, White. 1882, appears to be synonymous. Its type is L. POWELLI, White, from the Jurassic of *Utah*.

Genus DESHAYESIA, Raulin. 1844.

Shell subglobose, thick, umbilicated, spire short; aperture entire, semicircular, oblique, columella convex, denticulated, outer lip smooth internally.

Eocene and Miocene; Paris and Bordeaux basins.
D. NERITOIDES, Grat. Struct. and Syst. Conch. Pl. 78, f. 59.

This genus presents a very remarkable combination of the characters of Nerita and Natica, and appears to establish a passage between those genera.

Genus NERITINA, Lam. 1809.

Shell imperforate, rather thin, globose, with short spire, usually smooth, columellar lip flattened, smooth, straight-margined, finely denticulated or smooth, outer lip sharp, not callously thickened or toothed within, aperture with a projection on the inner surface near the base of the columella (Pl. 1, fig. 16).

Operculum calcareous, completely closing the aperture; exteriorly paucispiral with excentric nucleus, interiorly with an apical

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and a claviform apophysis, both arising from the summit, and sometimes a medio-marginal apophysis in addition, arising from the columellar or inner margin (Pl. 1, figs. 9, 10).

No important differences in the soft parts have been detected between Nerita and Neritina. Dentition, Pl. 1, fig. 3.

About 200 generally recognized species have been described. They are mostly fluviatile, but a few inhabit marine or brackish water, and a very few are of terrestrial habitat. They are mostly tropical and subtropical in distribution. Fossil, they occur from the liassic downwards, the pattern of coloring being well preserved; the genus becomes numerous in species in the miocene and pliocene.

The Neritinæ are small, smooth, globular shells, ornamented with a great variety of black or purple lines, bands or spots, covered by a smooth, polished, horny epidermis. Some species are amphibious, clinging to the roots of Nipah palms and other trees on the margins of rivers, while a few inhabit the foliage of tall trees that overhang the water.

Neritella (Humphrey. 1797), Gray. 1847, *Lamprostoma*, Swains. 1840, and *Neritæa*, Roth, are synonyms.

Section NERITINA (sensu stricto), Swainson. 1840.

Lip sharp, columellar lip rather convex, with crenellated margin, parietal ridge well marked, dentiform, form ovoid with rather high spire, usually strigate. Operculum reddish or blackish, both processes well developed, separate. Fluviatile. N. ZIGZAG, Lam.

Section PUPERITA, Gray. 1857.

Shell white, with black zigzag strigations, yellowish within.

Similar to the above, but marine. N. PUPA, Linn.

Section NERITODRYAS, Martens. 1869.

Columellar margin smooth. Rib of the operculum deeply furrowed, multilobate at the tip, deeply excavated beneath. Terrestrial. N. CORNEA, Linn.

Inhabit damp foliage, *Philippines*, etc.

Section THEODOXUS, Montf. 1810.

Transversely globose, smooth or nearly smooth, columellar margin smooth. The claviform apophysis of the operculum distinct, the apical apophysis rudimentary. Fluviatile. Inhabits mostly rivers of *Europe* and *Western Asia*.

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Neritoglobus, Kobelt. 1871, *Elea*, Ziegler. 1833, and *Neritoconus*, Kobelt. 1871, are synonyms. N. FLUVIATILIS, Linn.

Kobelt separates the species into two subsections, according to the globose or conical shape of the shell, but the latter form represents an abnormal growth, including specimens of species undoubtedly belonging normally to the former.

Section NERITODONTA, Brusina. 1884.

Columella thickened, callous, columellar margin subdenticulated; parietal apophysis projecting. N. LUKOVICI, Brusina. Tertiary of *Dalmatia*. The genera (!) *Tripaloia*, Letourn., and *Calvertia*, *Saint-Simonia*, *Petrettinia* and *Burgersteinia*, Bourg., are identical.

Section NERITILIA, Martens. 1879.

Columella smooth; operculum with a single erect spatulate process. N. SUCCINEA, Recluz. *Guadeloupe, W. I.*

Section SMARAGDIA, Issel. 1869.

Eyes sessile at the base of the tentacles. Shell greenish, obliquely oval, with short spire; columellar area callous, the margin finely denticulate. N. VIRIDIS, Linn. Marine.

West Indies, Mediterranean, Pacific.

Gaillardotia, Bourg. 1876, is a synonym.

Section STANLEYA, Bourg. 1885.

Brilliantly polished, transparent, spirally sulcate, imperforate, with large parietal callus, 3 sp. *Lake Tanganyika*. N. NERITOIDES, Smith.

Section CLYPEOLUM, Recluz. 1850.

Shell globular, oval or conic, covered by a corneous epidermis, columellar margin not dentate, outer lip prolonged upward on the spire in a tongue-like manner. Operculum colored, with well developed apophyses, the claviform apophysis grooved. Fluviatile. *Indo-Pacific*. N. PULLIGERA, Linn.

Section NERITONA, Martens. 1869.

Oval globular, with very short spire; peritreme widely developed, subcontinuous, columellar margin not denticulate. Operculum with the apical process depressed, flattened, lobate at the tip. Fluviatile. N. LABIOSA, Sowb.

Subgenus CLITHON, Montfort. 1810.

Shell coronated with tubercles, or short or long spines (sometimes unarmed), and covered by a corneous epidermis; margin of colum

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ellar lip usually finely denticulated, often with a large superior tooth. Operculum with rib and apophyses well developed, the latter connected for half their length.

The spines that usually ornament the whorls are tubular, and sometimes very long. They are fluviatile and tropical, crawling slowly, and only showing during locomotion the tentacles and tip of the muzzle; they seem to prefer a stony bottom, clear and free from weeds, and quiet water. N. LONGISPINA, Recluz.

Subgenus NERIPTERON, Lesson. 1830.

Shell flattened, biauriculated posteriorly, spire postero-lateral; inner lip septiform, with non-denticulated margin, outer lip very much dilated behind. Operculum typical. Fluviatile. *Polynesia.* N. TAHITENSIS, Lesson.

Section ALINA, Recluz. 1842.

Shell flattened, transversely dilated, lip irregularly expanded, sinuous, margin of inner lip finely denticulated. Operculum typical. Fluviatile. *Central America.* N. LATISSIMA, Brod.

Subgenus DOSTIA, Gray. 1840.

Shell sandal-shaped, solid, the apex completely posterior and a little lateral; peristome continuous and free; inner lip septiform, arcuated and denticulated in the centre of its margin. Operculum typical. Brackish water. *East Indies.* N. CREPIDULARIA, Lam.

Genus VELATES, Montfort. 1810.

Oval conic, spiral at the apex only; last whorl greatly enlarged, resembling Trochita externally; aperture basal, semicircular, its margin forming with that of the wide, flat columellar lip a circular outline, columellar margin dentate. Operculum as in Neritina.

Tertiary of *Europe*, *India*, *Madagascar*, etc. V. PERVERSA, Linn. (Struct. and Syst. Conch., t. 78, figs. 81, 82).

Young individuals are Neritiniform, and the apex is completely lateral.

Section VELATELLA, Meek. 1878.

Shell small, oval; apex posterior, spiral, dextral, submedian. V. CARDITOIDES, Meek (Struct. and Syst. Conch., t. 78, figs. 85, 86). Laramie formation, *N. America.*

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Subgenus TOMOSTOMA, Desh. 1823.

Shell oval, apex slightly spiral, inclined posteriorly, base rounded. PILEOLUS NERITOIDES, Desh. Eocene, *Europe.*

Calana, Gray, 1844, is a synonym.

This group, resembling the recent Navicellæ, has been referred by myself and others to Pileolus.

Genus NERITOMA, Morris. 1849.

Shell ventricose, thick, apex eroded; aperture with a notch in the middle of the outer lip, inner lip excavated in the middle, without teeth. Jurassic, *Europe.* N. ANGULATA, Sowb. (Struct. and Syst. Conch., t. 78, fig. 63).

Casts of this shell are common, and exhibit the interior characteristic of the Nerites:—it was probably fluviatile.

Subgenus NERIDOMUS, Morris and Lycett. 1850.

Smooth, ovately globose, spire small, oblique; last whorl very large; aperture ovate or semilunar, outer lip thick, inner lip convex, smooth. Great Oolite, *England.* N. HEMISPHÆRICA, Römer. (Struct. and Syst. Conch., t. 78, f. 64).

Subgenus ONCOCHILUS, Pethö. 1882.

Shell smooth, columellar area covered by a swollen, thick callosity, the margin smooth or with two or three small teeth; outer lip sharp, smooth within. Triassic, Jurassic. N. GLOBULOSUS, Klipstein.

Genus DEJANIRA, Stoliczka. 1860.

Shell subglobose, consisting of a few whorls, the last one large, spirally grooved, often carinated posteriorly; aperture large, subtrigonal or oval-elongated, columellar lip callous, having three large plications, outer lip sharp. Operculum calcareous, inner margin sinuous, with groove corresponding with columellar plication, inner face with an obtuse claviform apophysis.

Lacustrine Cretaceous of *Europe.* D. BICARINATA, Stol. (Struct. and Syst. Conch., t. 78, figs. 57, 58).

Leymeria, Munier-Chalmas. 1884, is a synonym.

Genus NAVICELLA, Lamark. 1809.

Shell imperforate, oblong, smooth, limpet-like with a posterior, submarginal apex, clothed with a corneous epidermis, often eroded

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at the apex; aperture large, basal, with a small, not dentate columellar shelf, and elongated lateral muscular scars. Operculum much smaller than the aperture, irregularly subtetragonal; labral margin subcartilaginous; columellar margin sinuous, partly bordered by a parietal apophysis, projecting at its extremity; apex vermicularly granulated on the inner face, with a few radiating striæ on both faces (Pl. 1, figs. 11, 12).

Head large, eyes on long peduncles, foot large, regularly oval, attached on each side to the visceral mass, forming a cavity open behind, in which the operculum is partly buried. Dentition, Pl. 1, fig. 2.

The species, about fifty in number, are exclusively East Indian and Polynesian in distribution. They are usually found on the banks of rivers adhering to floating sticks and to the petioles and roots of the Nipah palms and other plants that live near the water; they are also found attached to smooth stones.

The synonymy includes *Septaria*, Fer. 1807, which has priority, but has not usually found acceptance, *Catillus* (Humphrey. 1797), Swainson. 1840.

Section CIMBER, Montf. 1810.

Apex median, usually decorticated, projecting beyond the posterior margin. N. PORCELLANA, Linn.

Dr. Gray has characterized three sections of this group, under the names of *Laodia*, *Elana*, and *Paria*, all in 1867: they are distinguished partly from the opercula, partly from the shells. The former are so variable in their characters that they afford but slender material for systematic purposes. The following may perhaps be maintained:

Subsection PARIA, Gray. 1867.

Septum projecting, and truncated in the middle. N. FREYCINETI, Recluz.

Section STENOPOMA, Gray. 1867.

Apex median, posterior, submarginal, entire; shell generally narrow. N. LINEATA, Lam.

Section ELARA, H. and A. Adams. 1854.

Apex a little elevated above the posterior margin and laterally recurved. N. LAPEYROUSEI, Recluz.

To these Gray adds a group *Orthopoma*, 1867, characterized by an operculum only, the shell of which is unknown.

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Genus PILEOLUS (Cookson), Sowerby. 1823.

Shell limpet-like, solid, circular or elliptical at the base, convex, with subcentral, non-spiral apex; aperture small, semilunar; columellar septum convex, smooth or toothed, peritreme continuous. Operculum unknown. Fossil; Jurassic to Cretaceous. P. PLICATUS, Sowb.

Subgenus GARGANIA, Guiscardi. 1856.

Apex elevated, inclined backwards beyond the peritreme, surface radiately ribbed; lip with a central, internal depression. Cretaceous. G. BROCCHII, Guiscardi.

FAMILY *MACLUREIDÆ.*

Shell discoidal, few whorled, longitudinally grooved at the back, and slightly rugose with growth-lines; dextral side convex, deeply and narrowly perforated, sinistral side flat, exposing the inner whorls. Operculum calcareous, solid, sinistrally subspiral, with two internal apophyses, one of them beneath the nucleus, very thick and rugose.

Genus MACLUREA, Lesueur, *em.* 1818.

The characters are those of the family, of which this is the sole genus. A dozen palæozoic species from *North America* and *Scotland* have been described. M. LOGANI, Salter. (Struct. and Syst. Conch., t. 82, f. 8, 9); M. MAGNA, Lesueur. (Ibid, t. 65, f. 10).

Conchologists have been at a loss where to place this singular genus; according to some it has been included in Solariidæ; others have placed it in Pleurotomariidæ and in Atlantidæ. In my "Structural and Systematic Conchology" I have given it a position between Bellerophontidæ and Haliotidæ. I think that Dr. Fischer's removal of the group to the vicinity of Neritidæ, on account of the apophyses of the operculum, is a happy idea of that learned conchologist.

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Family *NERITOPSIDÆ.*

Animal with large head, and distant, elongated tentacles, the eyes on short peduncles at the exterior base, buccal orifice plicate, foot obtuse at either extremity, operculigerous disk surrounding the operculum, columellar muscle forming a ring interrupted above, mantle-margin thickened and papillary. Dentition, 8·1·(2+0+2)·1·8, Pl. 1, fig. 1.

Shell imperforate, neritiform, solid, columellar lip not dentate, the margin with a sinus in the middle. Operculum thick, calcareous, symmetrical, not spiral, with lateral, median nucleus, the exterior face convex, the interior face divided into two unequal parts, the columellar margin with a median appendage.

Fossil opercula of this family, occurring frequently without the shell, were long objects of doubt to scientists, and have received the names of *Peltarion*, Deslongchamps. 1858 (Pl. 1, figs. 5, 6), *Scaphanidea* and *Cyclidea*, Rolle. 1862, and *Hypodema*, Koninck. 1853. They have been supposed to be the beak of a cephalopod, a valve of a brachiopod or of a chiton, and an operculum of the polyp Calceola.

Genus NERITOPSIS, Grateloup. 1832.

General characters those of the family. Shell white, cancellated by spiral and longitudinal ridges and striæ. Operculum having on its exterior face and columellar margin a large truncate appendage, interior face depressed, with a labral, semilunar, smooth part, and a striate columellar part, with a pit on either side of it. (Pl. 1, figs. 7, 8). *Radula*, Gray, 1840, is a synonym. *East Indies, Polynesia.* N. RADULA is the only recent species. Fossil, secondary and tertiary.

Genus NATICOPSIS, M'Coy. 1844.

Shell imperforate, naticiform, thick, suture plicate; columella callous, more or less flattened, sometimes minutely tuberculated or transversely plicate, lip sharp (Pl. 1, fig. 17). Operculum something like Neritopsis, with convex exterior face, the interior face unequally two-parted, one part smooth, the other rugose, no appendage on the columellar margin (Pl. 1, figs. 13, 14).
Devonian-Triassic.

Europe, India.

I included this group in Naticidæ (Vol. viii, 8); the operculum, however, shows it to be a member of the present group. *Neritomopsis*, Waagen. 1880, Carboniferous of *India*, is a synonym.

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Subgenus TRACHYDOMIA, Meek and Worthen. 1866.

Whorls regularly ornamented with small tubercles. N. NODOSA, Meek and Worthen. Carboniferous. *Illinois.*

Included in Naticidæ (vol. viii, 8), but is better placed here

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FAMILY *ADEORBIIDÆ.*

Shell umbilicated, auriform, depressed, paucispiral, with oblique, entire aperture, simple columella, and rounded, sharp outer lip. Operculum corneous, paucispiral, with excentric nucleus.

Animal differing from Trochidæ by having no cirriform appendages of the foot. Dentition unknown.

In this group are provisionally included a few small shells, the relationships of which remain somewhat obscure.

Genus ADEORBIS, S. Wood. 1842.

Shell depressed, flattened below, white, subtranslucent, paucispiral, periphery angulated, widely umbilicated; aperture oblique, angular behind, lip sharp, not continuous.

Europe, Japan, Philippines, West Indies, etc. A. SUBCARINATUS, Mont.

Genus ARCHYTÆA, Costa. 1869.

Turbinated, but little elevated, thin, widely and deeply umbilicated, very finely decussated, appearing smooth, aperture rounded, with sharp, simple lip. Operculum corneous, smooth and flattened exteriorly, the spire slightly prominent in the centre of the inner side. A. DELICATUM, Phil. *Norway.*

Trachysma, Jeffreys, 1878, is a synonym.

Subgenus PSEUDORBIS, Monts. 1884.

Scarcely umbilicated, aperture circular, surface spirally costate, not cancellated. A. GRANULUM, Brugn. *Mediterranean.*

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Family *CYCLOSTREMATIDÆ.*

Animal with ciliated, thread-like tentacles, the eyes on short peduncles; snout bilobed; foot elongated, truncate in front, and extending at each angle into a filament; sides with three or four pairs of ciliated cirri, and a pair of auricular appendages in front, between the cirri and the tentacles. Jaws scaly.

Dentition, 8·(4 + 1 + 4)·8, Pl. 1, fig. 4.

Shell small, umbilicated, depressed, white, corneous or transparent, not nacreous; aperture circular, with continuous, sharp peristome. Operculum corneous, multispiral.

Genus CYCLOSTREMA, Marryatt. 1818.

Shell white, or uniformly colored, last whorl obliquely striate. C. CANCELLATA, Marryatt.

About 25 species have been described; distribution nearly universal. Fossil, tertiary.

Delphinoidea, Brown. 1727, is a synonym.

Section CYCLOSTREMA (sensu stricto).

Spire short, surface with spiral ridges, cancellated.

Section TUBIOLA, A. Ad. 1864.

Whorls rounded, simple, contiguous, spirally striate. C. SERPULOIDES, Montagu.

Section DARONIA, A. Adams. 1864.

Planorbiform, spire depressed, concave, whorls rounded, more or less disunited. C. SPIRULA, A. Ad.

Subgenus THARSIS, Jeffreys. 1883.

Globular, solid, polished; aperture circular, peristome continuous, adhering at the columellar margin; the umbilicus closed in the adult by a callus.

C. ROMETTENSIS, Seguenza. *Atlantic, Mediterranean.*

Subgenus GANESA, Jeffreys. 1883.

Naticiform, thin, always perforate, axis of the spire oblique; aperture subcircular, peristome continuous.

Atlantic Ocean; abyssal. C. PRUINOSA, Jeffreys.

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Genus VITRINELLA, C. B. Adams. 1850.

Shell minute, depressed turbiniform, white, often with spiral carinæ, widely umbilicated, and the umbilical region widely indented, whorls few, aperture large, rounded. Operculum unknown.

V. VALVATOIDES, C. B. Ad. A considerable number of species have been described by Prof. Adams from *Jamaica* and *Panama*. They are mostly unfigured, and Dr. Fischer thinks that species of Cyclostrema, Adeorbis, Teinostoma and Pseudorotella are included.

Genus TEINOSTOMA, H. and A. Adams. 1853.

Shell orbicular, depressed, polished or spirally striated, spire short, obtuse, not projecting; whorls few, the last with rounded or angulated periphery; umbilical region covered by a large, flat callosity; aperture transverse, distant from the axis, peristome continuous, lip sharp, simple. *Philippines, Japan, Mazatlan.*

T. POLITUM, A. Ad. Deshayes enumerates fourteen species from the Parisian Eocene.

Section CALCEOLINA, A. Adams. 1863.

Neritiform, depressed; inner lip with a large wide callus, covering the umbilicus—its margin straight, simple. T. PUSILLA, Adams. *Japan.*

Subgenus PSEUDOROTELLA, Fischer. 1857.

Shell thin, diaphanous, subdiscoidal, paucispiral, finely striated; aperture oval, peristome not continuous, outer lip sharp; umbilical region covered by a polished, transparent callus. T. SEMISTRIATA, d'Orb. *West Indies.*

Parkeria, Gabb. 1880, Miocene of West Indies, is a synonym.

Subgenus DISCOPSIS, Folin. 1869.

Shell discoidal, much depressed, flattened above, carinated, vitreous white, widely umbilicated; whorls few; aperture very oblique, triangular, the margins united by a channeled callosity, prolonged posteriorly. C. OMALOS, Folin. *Gulf of Mexico.*

Subgenus LEUCORHYNCHIA, Crosse. 1867.

Shell small, perforate, polished; whorls few; aperture rounded, columellar and basel margins united into a callous rostrum, prolonged past the umbilical region, but without touching it; peristome continuous, simple. L. CALEDONICA, Crosse. *New Caledonia.*

Evidently nearly allied to the preceding group.

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?Subgenus MICROTHECA, A. Adams. 1863.

Shell globosely turbinate, widely umbilicated, somewhat porcellanous, radiately, rugosely plicate, suture channeled and crenulated; aperture semicircular, peritreme continuous, inner lip thickened and arcuate, outer lip with thickened margin; umbilicus crenulated. Operculum unknown. C. CRENELLIFERA, A. Ad. *Japan.*

?Subgenus MORCHIA, A. Adams. 1860.

Shell obliquely oval, depressed, widely umbilicated, convex above, flattened beneath; whorls rapidly increasing, the last dilated and ascending, embracing the others to the apex; aperture oblong, obliquely horizontal, dilated below, narrowed above, peritreme continuous, thickened, bilabiate. Operculum unknown. C. MORELETI, Fischer, C. OBVOLUTA, A. Ad. *Japan, China, Red Sea.*

?Subgenus CIRSONELLA, Angas. 1877.

Shell minute, globosely turbinated, smooth, narrowly umbilicated; aperture circular, peristome continuous, slightly thickened. Operculum unknown. C. AUSTRALIS, Angas. *Australia.*

?Subgenus HAPLOCOCHLIAS, Carpenter. 1864.

Shell solid, turbinate, subperforate; aperture rounded, peristome continuous, thick, exteriorly varicose, columella not callous. Operculum unknown. C. CYCLOPHOREUS, Carp. *Mazatlan.*

?Subgenus CYNISCA, H. and A. Adams. 1854.

Shell turbinate, depressed, with large, deep umbilicus encircled by a spiral callosity; whorls ornamented by spiral granular ribs; aperture circular, inner lip straight; outer lip rather thick, subcrenulated, prolonged behind upon the penultimate whorl. *Japan.*
C. GRANULATA, A. Ad.

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Family *LIOTIIDÆ.*

Head proboscidiform, epipodial line with a pair of conical lobes and three pairs of cirri. Dentition?

Shell turbiniform or discoidal, white, with longitudinal ribs or clathrate; aperture feebly nacreous, peristome continuous, thick, with a callous varix. Operculum multispiral, hispid, corneous, with a calcareous layer formed of pearly particles spirally disposed.

Genus LIOTIA, Gray. 1842.

Characters those of the family.

Tropical and subtropical seas. L. Peronii, Kiener.

Section Arene, H. and A. Adams. 1854.

Ornamented with reddish radiating markings, periphery spinosely carinated. L. radiata, Kiener.

Subgenus Liotina, Munier-Chalmas. 1877.

Shell solid, cancellated, subdiscoidal, umbilicus large, with a spiral funiculum, aperture not nacreous, peristome varicose, reflected, sub-bilabiate. L. australis, Kiener, is a living representative; otherwise the group is Eocene.

? Subgenus Scævola, Gemmellaro. 1878.

Sinistral, thick, more or less conic, turriculated or conic-depressed, umbilicated, spire sharp, longitudinally variciformly plicate, crossed by spiral riblets; aperture circular. Liassic, Sicily. S. intermedia, Gemmellaro.

Genus CRASPEDOSTOMA, Lindström. 1884.

Naticiform, with longitudinal laminæ; aperture circular, with a widely expanded thick peristome, which is aliformly produced to the left at the base; umbilicus narrow. Silurian of *Gotland.* C. elegantulum, Lindström (Pl. 1, fig. 18).

? Genus CROSSOSTOMA, Morris and Lycett. 1854.

Imperforate, thick, turbinated, apex obtuse; aperture contracted circular, entire, sharp edged, with a reflected peristome some distance behind it; umbilical region with a dentiform callosity, formed by a funiculum which fills the umbilicus.

Jurassic. C. reflexilabrum, d'Orb. (Pl. 1, figs. 19, 20).

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Family *NERITIDÆ*.

Genus NERITA, Adanson. 1757.

Dr. von Martens, in the preface to his monograph of Nerita, now in course of publication, thus divides the genus into groups, which he considers "more or less natural," whilst not so sharply distinguished one from another as the similar divisions of Neritina. I find the older and more simple divisions which I have adopted full of difficulties to the systematist, which would be much increased by a more elaborate system. It is noticeable that Dr. von Martens has not arranged his own monograph by the system he proposes. His groups are:—

1. Theliostyla, Mörch. Whorls flattened, strongly ribbed, columellar area granular, the marginal teeth mostly small. Operculum granular. N. textilis. *Natere*, Gray, is a synonym.

2. Cymostyla, Martens. With weaker spiral ribs, whorls rounder, columellar area with parallel plications, the teeth stronger. Operculum granular. N. undata. *Pila*, Mörch, in part, but not *Pila*, Klein.

3. Pila, Klein. Shell bullet-shaped, with strong rounded spiral ribs, and strong columellar teeth. Operculum concave, weakly granular or smooth. N. plicata. *Ritena*, Gray, and *Tenare*, Troschel (not Gray), are synonyms.

4. Tenare, Gray. Teeth of the interior of the outer lip vanishing. Operculum smooth, with polished marginal zone.

a. Peloronta, Troschel. With weak spiral ribs. Marginal zone of the operculum swollen, distinct. N. peloronta.

b. Ilynerita, Martens. Spiral sculpture stronger, teeth of the mouth weaker. Operculum with scarcely developed marginal zone. N. planospira.

5. Nerita (restricted). Spiral sculpture weak or wanting, columellar area swollen, smooth. Operculum flat, with ribbed margin. N. polita. *Odontostoma*, Mörch (in part), is a synonym.

6. Amphinerita, Martens. Shell as in preceding group. Operculum granular. N. Umlaasiana, N. Senegalensis, etc.

7. Heminerita, Martens. Outer lip not toothed, columellar margin likewise toothless. Operculum with strongly developed skinny projection on its convex margin. N. pica. This group is the most nearly related to Neritina.

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Section NERITA, Lam. 1799 (sensu stricto).

N. ALBICILLA, Linn. Pl. 2, figs. 21–26.

With wide, flatly convex ribs, separated by narrow sulci, whitish, yellowish or orange color, densely or sparsely clouded, maculated or interruptedly or irregularly banded with black; aperture white, the columellar area tuberculated, with small teeth on the middle of the margin, outer lip with numerous small teeth.

Red Sea, Indian Ocean, Natal, Singapore, China, Philippines, Viti Is., etc.

It is *N. sanguinolenta*, Menke, *N. venusta*, Phil. (fig. 24), *N. marmorata*, Reeve (not Hombr. and Jacq.), = *N. crassilabrum*, Smith, ? *N. marginata*, Gmel., *N. cornea*, Forsk., *N. Erythræa*, Desh., and *N. Forskalii*, Recluz (figs. 25, 26).

N. PLEXA, Chemn. Pl. 2, figs. 27, 28.

With rugose or somewhat nodose spiral ribs, alternately smaller, whitish, maculated with black; aperture whitish, black spotted on the fimbriated outer margin, lip numerously plicate-dentate within, columellar area with a raised plicate outer border, the face numerously granulate, the centre of the margin two-toothed.

Diam. 30–45 mill.

East Africa, Cape, Madagascar, India, etc.

The synonyms are *N. costata*, Schum., *N. textilis*, Gmel., *N. chlorostoma*, Lam. (fig. 28).

N. EXUVIA, Linn. Pl. 2, fig. 29.

With strong, rugose, high ribs, broadest at the top, or somewhat overhanging, the intermediate sulcations deep, often in the larger specimens with a median thread-like, rugose, but much smaller riblet in each, the ribs blackish or obscurely maculated, the sulci greyish or yellowish grey, with zigzag black stripes; aperture white, the columellar area, including the raised border, covered by very numerous small granulations. Diam. 30–35 mill.

Indian Ocean, East Indies, Philippines.

It is *N. Malaccensis*, Lam. *N. chlorostoma*, Lam., which I have referred to the preceding species, Dr. von Martens places here; in the outer border of the columellar area it combines the characters of both, but its exterior ornamentation is, I think, decidedly that of *N. plexa*.

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N. GRANULATA, Reeve. Pl. 2, fig. 30; Pl. 4, fig. 70.

Blackish, spirally subcostate or lirate; columellar area strongly granulated, outer lip very strongly plicate within. Diam. 17 mill.

Hab. unknown.

N. CHAMÆLEON, Linn. Pl. 2, figs. 31–39; Pl. 6, fig. 4; Pl. 9, fig. 66.

Shell with numerous, low, rugose spiral ribs, sometimes alternately smaller, the interspaces varying from a mere line to the width of the ribs, whitish, yellowish white or orange color, maculated with dark grey, brown or black, often forming three indistinct interrupted bands; aperture white, columellar area with a few granules behind the marginal teeth, and some plications on the raised outer margin. Diam. 25–30 mill.

East Indies to Polynesia, East Africa.

The synonymy includes *N. stella*, Chemn. (figs. 31–33), *N. squamulata*, LeGuillou (figs. 34–36), *N. modesta*, Hombr. and Jacq. (fig. 37), ? *N. chloroleuca*, Phil., *N. scabrella*, Phil., *N. Arabica*, Reeve (fig. 38), a tessellated specimen, *N. annulata*, Reeve (figs. 39, 4), *N. bizonalis*, Lam., and probably *N. electrina*, Reeve (fig. 66).

N. EXCAVATA, Sowb. Pl. 8, fig. 34.

With strong, approximate, flattened spiral ribs, black variegated with white; aperture yellowish, black-margined, columellar area excavated, granular, marginal teeth tumid, acute, plications of lip strong, the upper and lower larger. Diam. 22 mill.

Hab. unknown.

Apparently not very different from *N. granulata*, Reeve.

N. ORYZARUM, Recluz. Pl. 3, fig. 40.

With rather distant and faint low spiral riblets, black, with zigzag maculations and sometimes an interrupted band of white, lip with faint plicate denticles within, columellar margin with three or four minute denticles, the area with several small granulations, its outer margin with a few plications. Diam. 1 inch.

Aracan (Hanley), *Bombay* (Recluz).

N. SEMIRUGOSA, Recluz. Pl. 3, figs. 41–43.

With numerous low riblets and much narrower grooves, whitish, with usually small, frequently linear series of black maculations, sometimes undulated, or more or less confluent; lip plicately toothed within, columellar margin strongly three-toothed, the area

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convex, with a few more or less elongated granules below, the outer margin frequently plicate. Diam. 25–40 mill.

Indian Ocean, Mauritius, E. Africa, East Indies, Philippines, Australia, Polynesia.

The synonyms are *N. maura*, Recluz (fig. 43), *N. histrio*, Gmel. (fig. 42), *N. atrata*, Lam. (last whorl entirely black), and *N. Chemnitzii*, Recluz.

N. Longii, Recluz. Pl. 3, figs. 44, 45.

With rather wide, close, smooth, rounded ribs, yellowish, well covered with brownish or blackish maculations, sometimes obscurely trifasciate; lip numerously toothed within, the upper two teeth strong, columellar margin tridentate, area granular, outer margin convexly raised, strongly plicate. Diam. 25–33 mill.

Red Sea to Bombay.

N. Hindsii, Recluz. Pl. 3, figs. 46, 47.

With rather distant thread-like, granularly rugose liræ, and sometimes intermediate much smaller ones, whitish, yellowish or greyish, punctate and maculated with black; aperture white, columellar margin minutely two to four toothed, area flattened, with a few granules. Diam. 16–20 mill.

Philippines.

N. planospira, Anton. Pl. 3, fig. 48.

Shell flattened above, with an obtuse shoulder angle, with elevated, rounded, somewhat irregular, thread-like riblets, and frequently much smaller intermediate lines, yellowish grey or light purplish, with maculations, bands or zigzag strigations of brownish black or purplish black; aperture yellowish white, lip teeth obsolete, columellar margin obtusely 4-dentate, area with a few granules, outer margin with a long blotch of black. Diam. 20–30 mill.

Indian Ocean, Japan, Australia, Polynesia.

The synonyms are *N. atropurpurea*, Recluz, *N. bizonalis*, Mörch, and *N. angularis*, Hombr. and Jacq.

N. reticulata, Karsten. Pl. 3, figs. 49, 50.

With very irregular crowded spiral sculpture, often with intermediate smaller threads, or with a pair of smaller lines between each pair of ribs, rugosely crossed by close growth-lines, whitish, unicolored, or more frequently maculated, subtessellated or undulatingly strigate with red or black; lip with numerous small plicate denticles, columellar margin slightly sinuous in the middle with 2

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or 3 minute teeth, area flat, with a few granules below, and plications above, marked by a central bright orange red spot.

Diam. 12–20 mill.

East Indies to Polynesia.

The red spot on the columellar area is very characteristic and is seldom absent. The species is very generally known under the later name of *N. signata*, Macleay; other synonyms are *N. rudis*, Wood, *N. petichialis*, Mörch, ? *N. musiva*, Gould (in part), and *N. fragum*, Reeve (fig. 50).

N. PATULA, Recluz. Pl. 3, figs. 53–56, 51, 52.

With 30–40 close, unequal, flattened riblets, crossed by close striæ, variegated with grey and black, sometimes with black bands articulated with white; aperture white, the lip-teeth minute, numerous or obsolete, columellar margin distinctly sinuous in the middle and the sinuosity indistinctly toothed, the area concave, yellowish, with a central semicircular depression, granular and blotched with black, base with a transverse plica. Diam. 18–25 mill.

Moluccas, Philippines.

It is *N. musiva*, Gould, *N. Beaniana*, Recluz (fig. 55), *N. Dombeyi*, Recluz (fig. 56), *N. dilatata*, Recluz, and *N. unidentata*, Hombr. and Jacq. (figs. 51, 52).

N. SENEGALENSIS, Gmel. Pl. 3, figs. 57, 58.

With numerous, low, flat-topped riblets, divided by incised lines, the sculpture often very faint, blackish, maculated and variegated with yellowish grey; lip minutely dentate within, columellar margin concave and moderately 2–3 dentate in the middle, area flattened with a number of tubercles, outer margin narrowly elevated and plicate. Diam. 15–25 mill.

W. Africa, Cape Verd Is.

N. Largillierti, Phil., is a synonym.

N. ANTHRACINA, Busch. Pl. 26, fig. 96.

Black, marbled with yellowish, spirally, and irregularly longitudinally striate, epidermis rough; lip toothed within, columellar margin quadridentate, median tooth minute, area concave, granular.

Diam. 14 mill.

Java.

This species has not been identified.

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N. NIGERRIMA, Chemn. Pl. 8, figs. 42, 43.

Shell thick, spirally grooved, grooves often becoming obsolete towards the aperture, black, polished; aperture whitish or yellowish white, the outer lip finely denticulated within, columellar margin toothed in the middle, area obscurely wrinkled above, granular below. Diam. 1·25 inch.

Australia, Polynesia.

This is *N. nigerrima*, Chemn., as unfolded by Reeve and others; the original figures are not readily determinable. *N. achatina*, Reeve (fig. 43), is a probable synonym.

N. MACULATA, Pease. Pl. 4, fig. 61.

Minutely spirally ribbed, separated by engraved lines, polished, black, minutely, numerously flecked with yellowish grey; aperture white, lip numerously toothed within, columellar margin with two small median teeth and a larger quadrangular one above them, area concave, tuberculated. Diam. 15–18 mill.

Central Polynesia.

It is *N. Schmeltziana*, Dunker.

N. ARGUS, Recluz. Pl. 4, fig. 59.

Shell smooth, indistinctly, closely spirally striate, olive brown or blackish, shagreened with minute white flecks, often apparent only on close inspection; aperture yellowish white, outer lip with numerous small plicate denticles, larger at the extremities of the series, columellar margin with four minute teeth, area flattened, with a few granules. Diam. 1 inch.

Philippines, Hong Kong, China.

The species was described as from Rio Janeiro, but has never been authoritatively illustrated; for convenience, Reeve's identification of it with a rather common oriental species, is followed.

N. FULGURANS, Gmelin. Pl. 4, figs. 62, 63, 66–69, Pl. 9, fig. 63.

Shell with numerous, narrow, distinct rounded ribs, separated by incised lines, minutely scabrous from the crossing of close growth-striæ, black, unicolored or maculated with yellowish grey; aperture white, lip with two stronger teeth above and below, and numerous intermediate plicate denticles, columellar margin with two minute median teeth and a larger quadrate one above them, area flattened, granular. Diam. ·75–1·25 inch.

West Indies, Brazil, Panama to Gulf of California.

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Var. PRÆCOGNITA, C. B. Ad. Fig. 63.

Embraces the lighter colored specimens, being yellowish grey, upon which are blackish maculations composed of separate short lines and markings, sometimes forming indistinct, irregular, interrupted bands.

Var. BERNHARDI, Recluz. Figs. 66–69; Pl. 9, fig. 63.

Spire usually somewhat flatter so as to form an obtuse, almost obsolete shoulder-angle, color varying from black to spotted, and maculated with yellowish grey or orange color. Size somewhat smaller.

West Coast of N. America, Panama, Mazatlan.

Usually distinguished by the above characteristics, which are, however, all shown not infrequently by occasional West Indian specimens. *N. funiculata*, Menke, and *N. genuana*, Reeve (fig. 68), are synonyms; to which may probably be added *N. albipunctata*, Reeve (fig. 65, and Pl. 9, fig. 63), the locality of which is unknown.

N. TESSELLATA, Gmelin. Pl. 4, figs. 71–74; Pl. 9, fig. 69.

With ten or twelve rounded low ribs, separated by deep, narrow grooves, white, strigate, tessellated or nearly covered with black; aperture white, lip with numerous plicate teeth within, the upper and lower ones larger, columellar edge concave, with small teeth in the middle, area flattened, with a few granules. Diam. 18–24 mill.

West Indies, Florida.

Sometimes the ribs are more numerous by their division, and by the interpolation of smaller intermediate ones. The species is also subject to erosion in such manner that the black markings become elevated and the ribs obliterated, in this condition becoming *N. exarata*, Pfr. Other synonyms are *N. varia* (Meusch.), Mörch, *N. Antillarum*, Gmel., *N. striata*, Chemn., *N. Listeri*, Recluz (fig. 73), a nearly black condition, as is also *N. nivosa*, Reeve (fig. 74), referred here with some doubt, and *N. comma-notata*, Reeve (fig. 72), and *N. scalpta*, Reeve (fig. 69), the localities of both of which are unknown.

Section PELORONTA, Oken. 1815.

N. PELORONTA, Linn. Pl. 4, figs. 75–77.

With broad, flatly rounded ribs and narrow intervening sulci—which very seldom give rise to very small riblets; yellowish or whitish tessellated or marked in a zigzag manner with dark red and black, the tessellations sometimes forming broad spiral bands in

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which the colors alternately appear, in other cases promiscuously scattered; aperture white, outer lip minutely dentate within, columellar margin with one or two strong central teeth, area somewhat concave, with a few plicate granules, the central portion, and surrounding the teeth, stained blood-red. Diam. 1–1·75 inch.

Florida, West Indies.

The well-known "bleeding tooth." The ribs are sometimes very faint, and occasionally the surface is entirely smooth.

N. VERSICOLOR, Gmelin. Pl. 4, figs. 78, 79; Pl. 5, fig. 80.

With broad, rounded ribs, separated by narrow grooves, varying occasionally to entirely smooth (fig. 80); light yellowish, rosy or whitish, tessellated, maculated or with zigzag stripes of red and black, in some cases of the latter only, in others forming alternate spiral bands of markings in one color or the other, but mostly intermingled; aperture white, outer lip dentate within, columellar margin decidedly convex, with three or four distant strong teeth, area smooth or obsoletely plicate. Diam. 75–1·25 in.

Florida, West Indies.

This is *N. striata*, Chemn., *N. variegata*, Chemn., and *N. tricolor*, Gmelin.

N. HELICINOIDES, Reeve. Pl. 9, figs. 71, 72.

Whorls faintly spirally ribbed, yellowish, maculated with black or red, sometimes forming alternate bands; lip plicate within, columellar area smooth, the margin two or three dentate.

Diam. 15 mill.

Hab. unknown.

N. pellis-serpentis, Reeve (fig. 72), is doubtless identical. Very probably this species to be referred to the proceeding, but the figures do not show its convex margined columella.

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N. WINTERI, Phil. Pl. 9, fig. 73.

Spirally costate, whitish; lip very thinly toothed within, columellar margin four-toothed, area plane, a little wrinkled. Diam. 16 mill.

Moluccas.

I know nothing about this species.

N. INCERTA, Busch. Pl. 8, fig. 48.

Dark brownish or blackish, minutely speckled with greyish white; lip minutely denticulated within, columellar margin with five small teeth, area smooth. Diam. 14 mill.

Java.

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The condition of the specimen figured by *Philippi* was too poor to do justice to its characters; I can only guess at its relationships.

N. ATRATA, Reeve. Pl. 8, fig. 40.

Black, spirally linearly grooved; aperture white, the outer lip black margined, with rather strong internal plicate teeth, columellar area smooth, the margin minutely toothed in the middle.

Diam. 28 mill.

Australia, New Zealand, etc.

Reeve figured this species for the *N. atrata*, Chemnitz—which it probably is not, and on this account von Martens preferred for it the name *N. punctata*, Quoy—which it ertainly is not, whilst Hutton imposed the name of *N. saturata*, and E. A. Smith that of *N. melanotragus*, both in 1884, with a probable priority of publication of the former name. Watson (Voy. Challenger, xv, 132) reviews the whole subject, preferring the name *N. punctata*. Inasmuch as Chemnitz was not binomial and therefore not entitled to quotation, and his figures and description are neither of them sufficient for identification, whilst they indicate that at least two species were confounded by him, I think it preferable to treat him as non-existent, and quote Reeve; especially as he has been followed by others, so that *his atrata* has become well-known. *N. nigra*, Gray (who quotes Quoy) in "Dieffenbach's New Zealand" has been cited by authors as applying to the present species, but the name is not accepted by them on account of the prior *N. nigra*, Chemn. They show that Quoy never described a *N. nigra*, but then neither did Gray; he merely mentioned the name in his above list, and it is impossible to determine what species he may have intended. Finally, different as this species is from *N. nigerrima*, Chemn., in its form and absence of columellar granulations—actually a group distinction, I have nevertheless some suspicion that it is only a variety of it, and that it connects that species with *N. morio*, which, on account of its smooth inner surface of the lip belongs to still another group. In my saner moments I am well-aware that such vagaries of conjecture are simply the demoralizing result of the questionable questioning which has largely supplanted the questionless faith of the last generation of conchologists.

N. ATRAMENTOSA, Reeve. Pl. 8, figs. 44.

Shell slightly spirally striated, black or dark olivaceous variegated with black; aperture white, outer lip strongly toothed within at

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the extremities of a row of fine denticles, inner margin with two small teeth and a superior, quadrangular larger one.

Diam. 28 mill.

Swan River, Australia.

N. YOLDII, Recluz. Pl. 9, figs. 55–57.

Faintly, closely spirally striate or smooth, yellowish white maculated in a zigzag manner with black, sometimes black with white markings, often with a light band on the darker specimens, or a dark band on the lighter ones; aperture yellowish, the outer lip dentate within, columellar margin minutely or obsoletely dentate in the middle, area smooth or very faintly marked by a few tubercles.

Diam. 18 mill.

Red Sea, Indian Ocean, Hongkong.

Sometimes this species, like some West Indian ones is subject to an erosion which excavates the white portions leaving the black in relief. *N. haustrum*, Reeve (fig. 56), and *N. Peruviana*, Phil. (fig. 57), which is not from Peru, are synonyms.

Section PILA, Klein. 1753.

N. PLICATA, Linn. Pl. 5, figs. 81–83.

Shell spirally ridged, with equal, excavated interstices, each about 18–20 in number on the body whorl, whitish or brownish white, here and there spotted and streaked with black; lip crenated, with several minor internal teeth, with a larger one at each extremity of the series, columellar margin with four strong teeth, columellar region rugosely wrinkled. Diam. 15–30 mill.

Indian Ocean, Formosa, Polynesia, Sandwich Is.

Sometimes unicolored whitish, sometimes regularly tessellated with black, or the spots so disposed as to form interrupted bands. Occasionally very thick specimens occur in which the sculpture is reduced to rugose striæ or partially or wholly disappears. Entirely black specimens are known as *N. ringens*, Reeve (fig. 83). Other synonyms are: *N. lactaria*, Linn., *N. Otaiensis*, Lesson.

N. COSTATA, Chemn. Pl. 5, fig. 84.

With about 12–15 strong spiral ridges, which are black, and equal, with excavated yellowish olivaceous interspaces; lip crenulated, toothed as in the preceding species, columellar area tuberculated below the plications. Diam. 15–35 mill.

Indian Ocean, East Indies, Japan, Australia, Philippines, etc.

It is *N. grossa*, Born, and *N. scabricosta*, Delessert.

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N. GROSSA, Linn. Pl. 5, fig. 85.

With 10–12 strong, spiral ridges and rather wider deeply excavated sulci, frequently developing a central, much smaller riblet, white, subradiately maculated with dark grey, varying to blackish; lip scarcely crenulated, very thick, internally bearing two strong teeth above and usually one below, with an intermediate series of numerous fine denticles, columellar teeth strong, 3 or 4, the area covered with wrinkles. Diam. 25–33 mill.

Indian Ocean, Philippines, N. E. Australia.

N. Ascensionis, Lam. is a synonym.

N. UNDATA, Linn. Pl. 5, figs. 86–95; Pl. 6, figs. 96–3; Pl. 7, fig. 30.

With 30–40, rounded, small spiral riblets and narrower shallow interspaces, yellowish, light brown or greyish with darker, olivaceous grey or black maculations, often arranged in radiating, undulating stripes, sometimes broad so as almost to cover the shell, aperture often stained with yellow, median teeth of outer lip very numerous, small, columellar area strongly rugose. Diam. 30–42 mill.

East Indies, Philippines, etc.

The above may be regarded as the typical system of coloration in a species varying much in this respect. It has, under different aspects received a number of names, several of which I retain as varietal, not so much because of intrinsic value as for mere convenience, these several forms having been heretofore recognized as species. With the type may be included *N. Papuana*, Recluz, *N. LeGuillouana*, Recluz (fig. 87), *N. marmorata*, Hombr. et Jacq., *N. Savieana*, Recluz, (fig. 88), *N. crassa*, Gould (fig. 89), *N. undulata*, Gmel. and *N. Novæ-Guineæ*, Lesson (fig. 90), the two last juveniles.

Var. MICRONESICA, Martens.

Blackish olivaceous, with two spiral black bands.

Var. STRIATA, Burrow. Figs. 91–94, 100, 1.

Costulations small, close, somewhat unequal, greyish, yellowish, or light brownish, usually spotted, undately strigate or trifasciate with dark grey, olivaceous or black, aperture tinged with yellow.

The synonyms are *N. chrysostoma*, Recluz (in part, fig. 91), *N. undata*, Gould, Var. *icterina*, Marts. including *N. aurantia*, Recluz, (fig. 92), *N. Tongaensis*, Hombr. et Jacq. *N. grisea*, Reeve (fig. 93),

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N. erubescens, Reeve (fig. 100), *N. Neritopsoides*, Reeve (fig. 1), and *N. costulata*, Busch and *N. Essingtoni*, Reeve (fig. 94), the two latter juveniles.

Var. SPENGLERIANA, Recluz. Pl. 6, figs. 96–98.

Greyish, maculated with white, interruptedly trifasciate with greyish black, riblets flattened, obscure, evanescent below, aperture white.

The type was a juvenile; and *N. oleagina*, Reeve (figs. 96, 97) is a synonym.

Var. QUADRICOLOR, Gmelin. Fig. 86.

Whitish, yellowish white or rosy white, the ribs maculated with purplish black, aperture white.

Red Sea, Bombay, E. coast of Africa, Southward to Natal.

It is *N. maris-rubræ*, Chemnitz.

Var. INCURVA, Martens. Fig. 99.

Variegated and interruptedly banded with black and yellowish grey, aperture white tinged with yellow or fulvous, the outer margin elongated and sinuated at the extremities, above and below; riblets about 30, flat, close, unequal. Diam. 30–39 mill.

Mozambique, E. Africa.

Var. GRAYANA, Recluz. Figs. 2, 3.

Riblets rather narrow and high, sometimes with intermediate smaller ones, purplish, varying to ash grey, somewhat obscurely maculated with purplish black or darker grey. Diam. 30–34 mill.

East Indies and Philippines.

Somewhat distinctive in color, but the markings and sculpture of the usual patterns.

Var. FUNICULATA, Reeve. Figs. 95, 30.

Black, with scattered white or yellowish white spots on the ribs, aperture tinged with yellow.

New Caledonia to Central Polynesia.

The ribs vary in number and development, and are often irregular in size on the same specimen. Some collectors have confounded it with the West American *N. scabricosta*, but that species is larger and more compressed and rounded and generally more rugose. Probably *N. punctata*, Quoy and Gaimard (Pl. 7, fig. 30) is identical.

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Var. FLAMMULATA, Recluz.

Yellowish grey, maculated sparsely with black, ribs about 24, alternately smaller. Diam. 23 mill.

Malay Archipelago.

N. SCABRICOSTA, Lam. Pl. 6, figs. 5, 6.

Shell with numerous, rather close rounded ribs, crossed by close scabrous longitudinal striæ, dark greyish or black, more or less maculated or spotted with orange brown, occasionally irregularly banded with the latter; lip black-margined, numerously toothed within, with larger teeth at the extremities, columellar teeth very strong and prominent, the area deeply plicate, with a perpendicular series of three tubercles below, sometimes confluent or obsolete.

Diam. 30–50 mill.

Panama, northward to Lower California.

The synonyms are *N. ornata*, Sowb. (fig. 5), *N. fuscata*, Menke, *N. Deshayesii*, Recluz (fig. 66), and *N. multijugis*, Menke. I retain Lamarck's name for this species although the identification is somewhat doubtful, Delessert figuring a *N. costata* for it; and I do this because in the United States the species has been usually so designated. Dr. von Martens calls it *N. ornata*, Sowerby, a name published about the name date. The scabrous surface and compressed rounded form well distinguish the species.

Section ODONTOSTOMA, (Klein. 1753), Mörch. 1852.

N. POLITA, Linn. Pl. 6, figs. 7–11; Pl. 7, figs. 12–23.

Shell thick, smooth, polished, sometimes with faintly rugose growth-lines or very obscure spiral riblets, greyish, flecked or spotted or banded with white, yellow, orange, red or black, the ground color itself varying rather unusually to one of the other colors, with or without flecks and bands; aperture porcellanous, polished, thick, outer lip smooth or obscurely dentate within, columellar lip feebly dentate, the area smooth. Diam. 25–40 mill.

Red Sea, Indian Ocean, Philippines, Polynesia, Mauritius.

The immense variation of coloring in this beautiful species has been the cause of a considerable duplication of specific names. I give examples showing the usual as well as some of the rarer patterns of ornamentation. The synonymy includes *N. nigra*, *N. flavescens*, and *N. hieroglyphica*, Chemn., *N. bidens* and *N. bifasciata*, Gmel., *N. Orbignyana*, Recluz (figs. 19, 20).

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Var. ANTIQUATA, Recluz. Fig. 17.

Closely wrinkled by impressed growth-lines, aperture and columella orange-tinted.

Var. AURORA, Dunker. Fig. 21.

Closely wrinkled as in Var. *antiquata*, but the shell less transverse, with somewhat elevated spire; white, with three yellowish brown bands mottled with chestnut, aperture orange-tinted.

Var. UMLAASIANA, Krauss. Fig. 18.

More obliquely elongated, the outer lip more extended upon the spire above, dark olivaceous, mottled with black.

So. Africa.

Var. RUMPHII, Recluz. Figs. 8–11, 16, 22, 23.

Smaller, usually closely spirally striate, coloring often in definite, wide or narrow bands, but varying to unicolored, mottled or interruptedly banded.

N. Doreyana (fig. 23) and *N. Guamensis* (fig. 22), of Quoy, are synonyms.

M. MAXIMA, Gmel. Pl. 7, figs. 24, 25.

Thick, lightly decussated by incremental striæ and evanescent spiral sulcations, yellowish grey interruptedly banded with black, and irregularly strigated and maculated with black and white; interior of outer lip numerously denticulate, columella smooth, bearing three prominent teeth on its edge, tinged with yellow.

Diam. 36 mill.

Central Pacific Ocean.

Var. OBATRA, Recluz. Fig. 25.

Shell olivaceous black, obscurely maculated.

Var. *trifasciata*, Montr. from New Caledonia, appears to repeat, on a darker ground-color the banded condition of the type.

N. BISECTA, Reeve. Pl. 7, fig. 26.

Shell with strong revolving ridges and equal intermediate sulci, the ridges black and divided in the middle by an incised line, sulci yellowish grey; outer lip many-toothed within, teeth of the extremities larger, columella smooth, yellowish, the margin three-toothed.

Diam. 23 mill.

West Africa.

N. ASCENSIONIS, Chemn. Pl. 7, fig. 27.

Shell with strong spiral ridges and somewhat wider sulci, yellowish grey, strongly tessellated with black on the ridges, outer lip

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numerously but inconspicously minutely toothed, inner lip three-toothed, area plane and smooth. Diam. 30–36 mill.

Ascension Isl.

N. diversicolor, Martyn is a synonym.

N. LINEATA, Chemn. Pl. 8, figs. 32, 33; Pl. 7, fig. 29.

Purplish grey or yellowish olive, with numerous, thread-like, purplish black spiral elevated lines, often sparsely speckled with white; outer lip numerously denticulate within, inner lip three-toothed, area smooth. Diam. 30 mill.

Malaysian Is., N. Australia, etc.

N. Birmanica, Phil. (fig. 29) is a synonym. *N. balteata*, Reeve (fig. 33) differs only in the riblets being a little more distant.

N. CEROSTOMA, Troschel. Pl. 8, figs. 36, 37.

Black, with about 22 strong, rugose, rounded spiral ribs, the upper ones wider, interstices narrow; aperture yellowish, outer lip numerously denticulate, columellar area smooth, the margin three toothed. Diam. 27 mill.

Peru.

N. GEMMULATA, Reeve. Pl. 8, fig. 38.

Greyish, with thin, rather distant, acutely granulated spiral liræ, tessellated with black and blue; outer lip without internal teeth, columellar margin obscurely tridentate, area smooth.

Diam. 1 in.

Hab. unknown.

N. FULGINATA, Reeve. Pl. 8, fig. 39; Pl. 7, fig. 28.

With depressed close spiral riblets, purplish or orange red banded with black or maculated; aperture yellowish white, outer lip numerously minutely toothed within, columellar area smooth, the margin three-toothed. Diam. 20 mill.

Singapore (Schmacker), *Viti Is.* (Garrett).

N. alveolus, Hombr. et Jacq. (fig. 28), appears to be identical and if the date on the title page is correct, was published a year earlier.

N. FILOSA, Reeve. Pl. 8, fig. 35.

Yellowish, with somewhat distant reddish, serrated, divided spiral ridges; aperture white, lip numerously toothed within, columellar area smooth, the margin with four teeth. Diam. 22 mill.

Hab unknown.

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N. GEORGINA, Recluz. Pl. 7, fig. 31.

With acute, subdistant ridges, frequently in pairs, yellowish grey articulated with black; aperture yellowish, with black spots on the margin, columellar area smooth, the margin obscurely dentate, denticles of interior of outer lip obsolete. Diam.18 mill.

King George's Island.

N. MORIO, Sowb. Pl. 9, fig. 75; Pl. 8, figs. 41, 46.

Black, usually polished, with slightly impressed spiral lines; aperture yellowish, the outer lip callously thickened within, but not toothed, columellar lip minutely or obsoletely toothed in the middle, area somewhat concave, polished, smooth. Diam. 18–22 mill.

Australia, New Zealand, Polynesia.

Confounded with *N. atrata*, Linn. *N. nigerrima*, Chemn. *N. Senegalensis*, Gmel. etc. but differs by the smooth interior of the outer lip, as well as by its oblique last whorl. It was described as a Neritina, and afterwards by Reeve as *N. Neritinoides* (fig. 46); another synonym is *N. carbonaria*, Philippi (fig. 41).

N. ESSINGTONI, Recluz. Pl. 8, fig. 45.

Shell with somewhat high spire, black, conspicuously spirally sulcate; outer lip smooth within, columellar lip slightly dentate on the middle margin, the area smooth. Diam. 18 mill.

Australia.

Has much the appearance of *N. nigerrima* externally, but differs in its columellar area; also resembles *N. atramentosa*, except in the absence of the teeth within the outer lip. Very probably they will all prove to belong to one and the same species.

N. PICEA, Recluz. Pl. 8, fig. 47; Pl. 9, figs. 52, 70, 74; Pl. 4, fig. 60.

Shell smooth, polished, with close or distant slight engraved lines, black, often showing faint minute greyish flecks, but frequently so obscure as to be scarcely visible; aperture white, outer lip without teeth, columellar margin minutely or obsoletely dentate in the middle, area flat, smooth, polished. Diam. 12–18 mill.

Japan, Polynesia to Sandwich Is.

I have been on the point of merging this in the preceding species as a synonym. In its unspotted state it is only distinguished by smaller size. *N. obscura*, Hombr. and Jacq. (fig. 52), *N. insculpta*, Reeve (fig. 74), and *N. bullula*, Reeve (fig. 70), are synonyms, The shell which Philippi has figured for *N. picea* (fig. 60), if that species, is a somewhat abnormal specimen.

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N. AFFINIS, Reeve. Pl. 9, figs. 51, 53, 54; Pl. 8, figs. 49, 50.

Shell usually transverse, closely, somewhat scabrously spirally striate, marbled and speckled with white and grey or olivaceous; aperture bluish white, minutely obsoletely toothed or edentulate within the outer lip, columellar area smooth, the margin obsoletely toothed. Diam. 10–13 mill.

Viti Islands.

N. Samoensis, Dunker (figs. 49, 50), *N. costulata*, Busch, and probably *N. Vitiensis*, Hombr. et Jacq. (figs. 53, 54) are synonyms.

N. PICA, Gould. Pl. 9, figs. 59, 60, 76.

Usually smooth, sometimes spirally striate, black with cuneiform markings or reticulations of white; aperture whitish, the outer lip smooth within, columellar margin minutely denticulated, the area flattened, smooth. Diam. 15 mill.

Japan, Polynesia.

N. Japonica, Dunker is evidently synonymous, but the figure given for that species in Thes. Conch. and which I have inadvertently copied (Pl. 9, fig. 58), is evidently something else. *N. melaleuca*, Martens and *N. rudis*, Pease (fig. 76), are to be added to the synonymy. The figure of *N. rudis* (copied from Pease), very poorly represents the shell; the types before me are undoubtedly *N. pica.*

N. VEXILLUM, Reeve. Pl. 9, fig. 61.

Spirally ribbed, with narrow intermediate grooves, orange colored, with two broad black, orange-spotted bands; aperture yellowish white, outer lip edentulous, columellar margin sharply toothed, the area flat. Diam. 22 mill.

Hab. unknown.

N. ARCTA, Hombr. and Jacq. Pl. 9, figs. 64, 65.

Spirally ribbed, white, with scattered dark spots; aperture without teeth, columellar area flattened, smooth. Diam. 17 mill.

Arru Is., N. of Australia.

I know nothing of this species; it has been overlooked, as most of the species of these authors have been, by Reeve and Sowerby.

N. STRICTA, Baird. Pl. 9, figs. 67, 68, 62.

With low spiral ridges, and broad shallow interstices, whitish with scattered black markings, varying to greyish black; aperture yellowish, lip thickened within, edentulate, columellar area smooth, the edge obsoletely dentate. Diam. 12–15 mill.

Polynesia, New Caledonia.

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N. Novæ-Caledoniæ, Baird (figs. 67, 68), is a synonym. My figure of *N. stricta* is unfortunately taken from Sowerby's Thesaurus, and is certainly not typical, Baird's figure being exactly like *N. Novæ-Caledoniæ* in all its features except being darker colored.

Unfigured Species of Nerita.

N. TENEBROSA, Recluz.	*Solo I., N. of Borneo.*
N. CORROSULA, Recluz.	*N. Guinea.*
N. SCABRELLA, and N. RINGICULA, Phil.	*Hab. unknown.*
N. HILLEANA, Dunker.	*Samoan Is.*
N. NOVÆ-HIBERNIÆ, Lesson.	*N. Ireland.*

Genus NERITINA, Lam. 1809.

Section NERITINA (sensu stricto), Swainson. 1840.

N. GAGATES, Lam. Pl. 10, figs. 77–79, 97, 98; Pl. 11, fig. 6.

Striulate, polished, olivaceous or brownish black, with close black zigzag lines; aperture bluish white. Diam. 18–26 mill.

Mauritius, Seychelles, Isle of Bourbon.

The synonyms are *N. liturata*, Recluz, *N. Caffra*, Gray, *N. zigzag*, Morelet. Von Martens has vars. *minor* (fig. 78), and *subplanispira* (fig. 79), the latter for depressed specimens. I think that *N. fulgurata*, Desh. (figs. 97, 98), from Isle of Bourbon, described from a single specimen, is simply a light-colored example of this species.

N. NATALENSIS, Reeve. Pl. 10, figs. 80, 81; Pl. 11, fig. 9.

Striulate, somewhat shining, yellowish brown with oblique black strigations, more or less decurrent or reticulately confluent; aperture bluish white. Diam. 19–23 mill.

Mozambique to Natal.

It is *N. zebra*, Krauss. *N. Moquiniana*, Recluz (fig. 9), is an unidentified species from "Islands of the South Sea," which appears to be closely related.

N. VARIEGATA, Lesson. Pl. 10, figs. 82–86; Pl. 12, figs. 23, 24.

Somewhat shining, variegated with yellowish brown and black, usually in an irregular net-work pattern, the meshes large or small, sometimes the black reticulations form irregular broad bands, and occasionally they cover the entire surface so as to make it nearly unicolored; aperture whitish or bluish white, the columella with a tinge of orange-brown. Diam. 16–23 mill.

East Indies, Polynesia.

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The synonyms are *N. Sumatrensis*, Sowb., *N. pulchra*, Sowb. (figs. 23, 24), *N. gagates*, Mörch, *Clithon Zelandicus*, var. *helvola*, Mousson (not Gould). *N. Wallisiarum*, Recluz, is black, with inconspicuous pellucid-white or brown dots, and is probably not distinct from *N. variegata;* I think it likely that *N. Cuvieriana*, Recl. (figs. 85, 86), should also be placed here. *N. pulchra*, Sowb. (figs. 23, 24), was described as from Panama, where it is believed no such species exists. Sowerby's figure shows some reddish zones alternating with olivaceous, which are not present in specimens of *pulchra* received from Sowerby as from Panama, but of a number of specimens of *variegata* from the Viti Islands, collected by Mr. Garrett, two have this peculiar red banding.

N. ZICZAC, Sowb. Pl. 10, figs. 87–92; Pl. 11, figs. 100, 5.

Striulate, shining, olivaceous or yellowish, with zigzag or undulating radiating black stripes; aperture bluish white, columella often tinged yellowish-brown. Diam. 20 mill.

East Indies, Polynesia.

According to the relative thickness of the stripes and interspaces the pattern sometimes appears to be black on an olivaceous ground, at others olivaceous on a black ground. Originally identified with *N. ziczac*, Lam., but is not that species; yet, as it has become well-known under that name, I have not deemed it advisable to adopt another for it, as Martens has done. The synonyms are *N. strigillata* (Lam.), Recluz, *N. aquatilis*, Reeve (fig. 100), *N. Jovis*, Recl. (fig. 5), *N. ramosa*, Meusch., and var. *interstitialis*, Martens, in which the olive color is replaced by orange brown.

The true *N. ziczac* of Lam. appears to be most nearly related to *N. reclivata*, Say.

Var. COROMANDELIANA, Sowb.

Olivaceous, with subtriangular black maculations.

N. triangularis, Meusch., and *N. pulcherrima* and *N. insignis*, Mousson, are synonyms. Martens has adopted this varietal name for the species.

Var. SERRULATA, Recluz.

Black, with numerous small olivaceous spots.

N. guttulata, Mouss., and var. *xanthostigma*, Martens, are synonyms.

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N. ZEBRA, Brug. Pl. 10, figs. 93–95.

Somewhat shining, yellowish olive or orange brown, with undulating radiating broad black stripes; aperture whitish.

Diam. 21–23 mill.

Northern So. America to Brazil; Porto Rico?, Panama?.

I find no characters by which to distinguish this from varieties of *N. ziczac*, unless it be by the less angulated pattern of the stripes and their greater width; moreover, I know of no such American form, and I cannot help thinking that, at least as to some of the identifications, the mistake has been made of confounding with it varieties of *N. reclivata* and *N. virginea*. Entirely similar shells are in the Philadelphia Collection, received from Cuming as from Taheiti. *N. lineolata* (? Lam.), of Sowb., Reeve, etc., and *N. sobrina*, Recluz (fig. 95), are referred here by Martens.

N. SMITHI, Sowb. Pl. 10, fig. 96.

Smooth, somewhat shining, light olivaceous, with close undulating black lines, occasionally confluent into varicose-looking wider ones; aperture bluish white. Diam. 22 mill.

Bengal.

N. tigrina, Benson, and *N. hamuligera*, Troschel, are synonyms.

N. PLUMBEA, Recl. P. 11, figs. 7, 8.

Striulate, a little shining, greyish olivaceous, unicolored or with two broad dark bands; aperture whitish. Diam. 19–25 mill.

Philippine Islands.

N. TURRITA, Chemn. Pl. 11, figs. 1, 2.

Shell oblong conical, lightly striulate, shining, spire elevated, pointed, olivaceous or brownish with oblique, curved or somewhat flexuous black stripes; aperture bluish white, columellar area yellow tinted. Length, 25–32 mill.

East Indies, Philippines, Australia.

The synonyms are *N. strigillata*, and *N. lugubris*, Lam., *N. nobilis*, Chenu.

Var. CUMINGIANA, Recluz. Fig. 2.

Strigations narrower, closer and more numerous.

N. SEMICONICA, Lam. Pl. 11, figs. 3, 4.

Olivaceous or light brownish, with two or three spiral rows of black markings, sometimes faintly olivaceous banded.

Length, 25–30 mill.

India.

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N. fimbria, Meusch., is a synonym. Von Martens and others consider *N. semiconica* a variety of *N. turrita*, but it appears to me to have the characters of a distinct species.

N. ROISSYANA, Recluz. Pl. 11, figs. 10–13.

Conical, olivaceous or bluish white, with very close zigzag black lines, often wider than the interspaces, so that the whole shell appears blackish; aperture bluish white, the columellar area yellow-tinted. Length, 16–20 mill.

Australia to Central Polynesia.

Shaped like a *N. turrita* in miniature, but with the broad stripes of that species replaced by very close zigzag lines. The synonyms are *N. cuprina*, Recl. (fig. 11), *N. chrysocolla*, Gould (fig. 12), *N. Navigatoria*, Reeve (fig. 13), *N. rivula*, Hombr. and Jacq., and *N. Vitiensis*, Mousson.

N. TURTONI, Recluz. Pl. 11, figs. 14, 15.

Orange or orange-red, often with a coppery lustre, with close, undulating, oblique, broad black stripes; aperture light olivaceous or greenish white, columella bright salmon color.

Diam. 18–25 mill.

Viti Is., in brackish and fresh water.

The locality, New Ireland, given by Hinds, needs confirmation. The synonymy includes *N. lugubris*, Sowb., *N. Zelandica*, Recluz, *N. helvola*, Gould, and perhaps *N. nux*, Brod., a unicolored brownish shell from Tahiti.

N. FULGETRUM, Reeve. Pl. 12, fig. 30.

Shell olivaceous, with blackish maculations and strigations; aperture whitish, columellar area orange-red. Diam. 16 mill.

Hab. unknown.

The direction of the pattern of ornamentation is the principal difference between this species, which remains unidentified, and the preceding one.

N. COMMUNIS, Quoy and Gaimard. Pl. 11, figs. 16–22.

Smooth and shining, variously solidly zoned with white, yellow [illegible]rple, a portion of the banding usually overlaid with zigzag black stripes; aperture bluish white, the convex columellar [illegible]ite or yellowish. Diam. 15–21 mill.

East Indies, Philippines; brackish water.

[illegible]hich I have selected will give some idea of this [illegible]t there are besides, many other combinations of

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coloring. *N. Waigiensis*, Lesson, *N. strigillata*, Sowb., *N. zebra*, Troschel, *N. elegantina*, Busch, and *N. elegantissima*, Mörch, are synonyms.

N. RECLIVATA, Say. Pl. 12, figs. 25–30.

Shell olivaceous, sometimes light brownish, with oblique, somewhat undulating or zigzag narrow black lines, usually parallel but sometimes reticulating, the aperture and convex columellar area bluish white. Diam. 15–23 mill.

Florida, West Indies, Mexico, Central America

N. lineolata, Lam., is now supposed to be identical, and according to printed dates of publication has three months' priority; but conceding this, it would still be of very questionable advantage to science to substitute a name which has been variously identified for one the application of which has never been doubted, and so has become well-known. *N. zigzag* of Lam., not authors, has also been referred here. Other synonyms are *N. microstoma*, d'Orb., *N gravis*, Shuttl. and Morelet, *N. olivacea*, Wiegm., and var. *conoidalis*, Martens, for the conical, lineolate form with parallel strigations; *N reticulata*, Cristofori and Jan, for the specimens with reticulated pattern; and *N. striolata*. Recluz (fig. 28), *N. Floridana*, Shuttlew. (fig. 29), and var. *rotundata*, Martens, for a short-spired form.

N. VIRGINEA, Linn. Pl. 12, figs. 31–45.

Smooth, polished, usually white, sage colored, yellowish or violaceous, with a fine, close painting of parallel longitudinal darker colored lines, either extending across the entire surface or interrupted so as to form spiral zones, upon this surface of close lines are placed miscellaneously numbers of subtriangular spots of the ground color of the shell, sometimes covering it entirely, at other times forming spiral bands of large spots, with smaller intermediate ones. Diam. 6–20 mill.

West Indies to Brazil.

I have figured some of the common as well as the more striking color modifications of this elegant and very variable species. There are two or three patterns of coloring which are much more common than the others, yet which cannot be called varietal; they are 1st, whitish violaceous, covered by close violet lines upon which are triangular spots; 2d, a similar pattern, but the colors light and dark olivaceous; 3d, light sage green, with darker lines, but almost covered over by the spots which are arranged somewhat as on a

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serpent's skin. The synonymy is enormous, including *N. Brasiliana*, Recluz, *N. trabalis*, and *N. chlorina*, Link, *N. flavopicta* and *N. vinosa*, Mouss., *N. Listeri*, Pfr., *N. turriculata*, Menke, *N. Matoni*, Mörch, *N. meleagris*, Lam., *N. elegantissima*, Hartm. (figs. 44, 45), *N. Jamaicensis*, Ads., *N. pulchella*, Gray, probably *N. Leachii*, Recluz, and *N. tenebricosa*, Ads., and vars. *oblonga* and *elongata*, von Martens.

N. TRISERIALIS, Sowb. Pl. 12, figs. 46, 47.

Whitish, closely lined with dark grey, covered by white triangular spots which are usually more conspicuous in three spiral series or bands. Diam. 14 mill.

Hab. unknown.

This species has not been identified; its coloring resembles that of *N. virginea*, but its form is more globose, with the whorls a little excavated above.

N. WALLACEI, Dohrn. Pl. 12, fig. 48.

Striulate, greenish, with seven narrow, dark green or blackish spiral bands; aperture white, columellar area strongly callous. Diam. 18 mill.

Arru Islands.

N. POUCHETI, Hombr. and Jacq. Pl. 12, fig. 49.

Brownish, with black transverse striæ; aperture large, rounded, with the columellar margin numerously dentate. Diam. 17·5 mill.

Amboina.

This species is only known through the original figure and description.

N. ADANSONIANA, Recluz. Pl. 13, figs. 50, 51.

Yellowish brown, flexuously strigate, and reticulate with dark olivaceous or black, usually with an overlaying pattern of miscellaneously arranged light spots; aperture and columellar area bluish white or yellowish white. Alt. 11 mill.

Senegal, Cape Palmas, W. Africa.

N. Sangara, Morelet is a synonym.

N. ATERRIMA, Koch. Pl. 11, fig. 99.

Globosely oblong, smooth, black, the spire elate, conical, somewhat acute; aperture white, columellar area flattened, the margin toothed in the middle. Diam. 15 mill.

Habitat unknown.

This species has not been identified.

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N. SAYANA and N. PHASIANA, Recluz. Unfigured. *Philippines.*

N. PICTA, Sowb. Pl. 13. figs. 52–55.

Smooth, polished, yellowish or grey or broadly alternately banded with both, with flexuous oblique, bluish white strigations; aperture bluish, columellar area flattened, chestnut color, margin rather strongly denticulate. Diam. 11–13·5 mill.

Gulf of California to Panama.

Various color variations have been named vars. *nigrofasciata*, *luteofasciata*, *guttata* and *albescens*, Miller.

N. UALANENSIS, Lesson. Pl. 13, figs. 56–68.

Smooth, shining, many colored, usually yellow, olivaceous or pink, with subundulating to reticulating close longitudinal purple-black or reddish lines, continuous over the whole surface, or interrupted to form spiral bands, often with subtriangular light colored spots with darker margins in spiral series; aperture usually yellowish, sometimes bluish white, columellar area narrow, a little convex, yellowish, faintly coriaceous-rugulose and foveolate, the margin with a central sinus which has four or five minute teeth, and a larger one above them. Diam. 7–12 mill.

Indian Ocean to Polynesia.

A widely distributed species, which closely mimics the West Indian *N. virginea*. Like that species, it inhabits both brackish water and the ocean, and it is equally variable in its markings. It is perhaps less conical, as a rule, smaller, its columellar area is more yellowish and flatter. The operculum differs somewhat from that of *N. virginea*, the rib and apophyses are well-developed, nearly equally large, with a connecting band almost equally elevated.

The synonymy includes *N. Oualaniensis*, Lesson, *N. nubila*, Busch, *N. Mertoniana*, Recluz, *N. nebulata*, and *N. Ceylonensis*, Recluz, *N. Garretti*, Mousson, *N. pulchella*, Mörch, *N. cincta* and *N. columbaria*, Recluz, *N. Gaimardi*, Souleyet, *N. ornatella*, *N. delicatula*, *N. guttulata*, and *N. multipicta*, Mouss. Mss. and the following color-varieties, named by von Martens: *conferta* (fig. 56), *polydelta* (figs. 57, 58), *diremta* (figs. 59, 60), *frondicincta* (figs. 61–64), *nigrobifasciata* (figs. 65, 66), *parcepicta* (figs. 67, 68).

N. NOULETIANA, Gassies. Pl. 13, figs. 69, 70.

Solid, shining, blackish violaceous, with superimposed tent-shaped whitish or yellowish maculations, apex violaceous; columellar area

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and aperture greenish yellow, the former concave, with 2–3 marginal teeth. Diam. 7, alt. 10–12 mill.

New Caledonia.

Possibly a variety of the preceding species.

N. MODICELLA, Desh. Pl. 13, fig. 71.

Oval-globose, whorls 3, the last large, rugose, blackish brown, with small greyish-white irregular scale-like spots; aperture yellowish white, columellar area wide, plane, smooth, the edge with a single obscure tooth-like elevation. Alt. 12, diam. 9 mill.

Ins. Bourbon.

Section PUPERITA, Gray. 1857.

N. PUPA, Linn. Pl. 14, figs. 72–74.

Smooth, opaque, white, longitudinally more or less flexuously and anastomosely strigate or coarsely or finely reticulated with black; aperture light orange-brown. Diam. 8–13 mill.

West Indies.

The synonyms are *N. delineata*, Boubée, *N. liturata*, Schultze, *N. venosa*, Menke and var. *tristis*, d'Orb., the latter for closely reticulated specimens.

N. RETICULATA, Sowb. Pl. 14, figs. 75, 76.

Solid, smooth or obsoletely spirally engraved, transverse, whitish, openly or closely reticulated with black; aperture yellowish.

Diam. 13 mill.

Tahiti, Paumotus, Mauritius.

Distinguished from *N. pupa* by its more transverse form and sulcations—when the latter are present. The synonyms are: *N. Desmoulinsiana* and *N. Bensoni*, Recluz.

N. HOLOSERICA, Garrett. Pl. 14, fig. 77.

Closely spirally striate, with sharp spire, blackish, under a thin greyish olivaceous, somewhat tomentose epidermis; aperture olivaceous yellow, columellar area flattened, polished, but very minutely granular. Diam. 12 mill.

Viti Is.

N. AMŒNA, Gould. Pl. 14, figs. 78–80, 84.

Shell transverse, whorls rapidly increasing, the last whorl swollen, spire scarcely raised; with rugose growth-lines and slight, impressed spiral striæ; greyish olivaceous or purplish-blue, sometimes with

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light reddish purple bands, speckled over with white spots; aperture tinged with yellow. Diam. 9–11 mill.

Viti and Samoa Is.

N. Godeffroyana, Mousson, Pl. 14, fig. 80, and probably *N. Guerini*, Recluz (fig. 84), are synonyms: if the latter determination be correct, it has precedence in publication; it is misprinted *N. Guinerii*, in Reeve.

N. MOROSA, Gassies. Pl. 14, fig. 81.

Solid, shining, striulate, greyish black, irregularly punctate with white; aperture bluish grey, the columellar area brown-tinged. Alt. 14 mill.

New Caledonia.

N. OBTUSA, Benson. Pl. 14, figs. 82, 83.

Shell spirally engraved, epidermis greenish or olivaceous; aperture ash color. Diam. 12 mill.,

India, Java.

N. spiralis, Reeve (fig. 83), is a synonym.

N. GUTTULATA, Gassies. Pl. 14, fig. 85.

Longitudinally and spirally striate, scarcely shining, violaceous black, sparsely white-dotted; whorls 1½, rapidly enlarging; aperture yellowish corneous, columellar area convex, minutely subgranular. Alt. 9 mill.

New Caledonia.

Appears to be allied to *N. amœna*, Gould. Described originally as *N. guttata*, a specific name preoccupied by Recluz.

N. SALMACIDA, Morelet. Pl. 14, fig. 86.

Thick, shining, laterally compressed, striate, with engraved spiral lines, more apparent above, greenish brown; aperture ashy white, columellar area light yellowish, the centre of its margin with two or three minute teeth. Alt. 13 mill.

Comoro Is.

N. MORCHIANA, Dunker. Pl. 14, figs. 87, 88.

Rather thin, olivaceous, with black zigzag narrow lines, thinly striate; aperture bluish white. Alt. 12 mill.

Madras.

I am not acquainted with this species.

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N. INCERTA, Gassies. Pl. 14, fig. 89.

Solid, striate, with spiral engraved lines, whitish under a black and rosy epidermis, with black lines or flames forming three bands; peristome whitish, interior white, yellowish or rosy. Alt. 13 mill.

N. Caledonia.

Only known to me by the figure and description.

N. ELLIPTICA, Guillou. Unfigured. *Marquisas Is.*

Section NERITODRYAS, Martens. 1869.

N. DUBIA, Chemn. Pl. 14, figs. 90–95.

Finely, faintly striulate, without spiral sculpture, olivaceous or orange-brown, with a fine or coarse pattern of zigzag black lines, often interrupted to form bands, sometimes only appearing here and there, or entirely absent, seldom confluent, making the entire surface thick; aperture bluish white, often with an orange tint near the margin, columellar area usually tinted with yellow, varying to orange brown, the margin edentulous. Diam. 20–27 mill.

East Indies, Philippines, New Caledonia, etc.

The synonyms are *N. fasciata,* Lam., *N. lugubris,* Lesson, *N. reticulata,* Quoy and Gaim., *N. zebroides,* Lesson, *N. Philippinarum,* Sowb.,? *N. vestita,* Souleyet, *N. bella,* Busch, *N. Adamsi,* Issel, *N. atra,* Lesson.

Var. APIATA, Recluz. Fig. 95.

Yellowish olivaceous, transversely flecked with yellowish white. Diam 16 mill.

As this has heretofore been treated as a distinct species, I retain it as a variety, but its characteristic markings shade off into those of *N. dubia,* of which it is a juvenile state of growth.

N. CORNEA, Linn. Pl. 14, figs. 96–100, 1.

With low, flatly rounded riblets separated by incised spiral lines, the sculpture usually faint, sometimes obsolete, yellowish brown or olivaceous, generally more or less interruptedly banded and subtessellated with black, occasionally all black; aperture whitish, columellar area white, or more or less tinged with yellowish to orange-brown, when white often with black blotches behind, margin edentulate, varying to obsoletely minutely toothed.

Diam. 25–42 mill.

East Indies, Philippines, New Caledonia, Viti Is., etc.

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I have included in the above description forms heretofore regarded as distinct, but which do not appear to possess permanent differential characters. The principal mark of this species is the presence of spiral sculpture, but I have before me specimens in which this is partially obsolete, suggesting very strongly a connection with *N. dubia*. The typical *N. cornea* embraces the smaller forms, with less developed sculpture, columellar area yellowish, becoming deeper, orange or blackish on the outer edge, the margin edentulate. Here may be placed as synonyms *N. amphibia* and *N. ampullaria*, Lesson, *N. morio*, Deshayes, *N. sulcata*, Anton, *N. Savesi*, Gassies (fig. 1), and *N. gagates*, Troschel, with var. *atramentaria*, Tapparone Canefri.

Var. SUBSULCATA, Sowb. Figs. 98, 99.

The shell is somewhat larger, often more distinctly sculptured, the color patterns more obscure or unicolored, the columellar margin obsoletely denticulated, the area white, with black blotches behind.

N. subsinuata, Mousson is a synonym, being a typographical error for *subsulcata*.

Var. CHIMMOI, Reeve. Fig. 100.

The largest form of the series, with moderate sculpture and darker epidermis, unicolored or obsoletely maculated and dotted; columellar margin edentulate, area orange-brown.

Var. NOLANI, Tryon.

Light violaceous, with several black bands over which are scattered opaque white fleckings.

A single specimen of this exquisite color-variety of the typical *N. cornea* is in the collection of the Philadelphia Academy.

Section THEODOXUS, Montf. 1810.

N. DANUBIALIS, Mühlf. Pl. 15, figs. 2–9.

Subglobose, occasionally spirally constricted (fig. 7), yellowish white, with irregular purple or brown undulating or zigzag lines, aperture bluish white. Diam. 11–13 mill.

Lower Danube, Northern Italy, etc.

The synonyms of the typical form are *N. Marsigliana*, Hartm., *N. Danubiensis*, Sadler.

Var. STRAGULATA, Mühlf. Figs. 4, 5.

Angulate form; spire depressed, shoulder of whorl obtusely angular, strigations wider, sometimes entirely black. The synonyms

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of this form are *N. gangrenosa*, Schmidt, *N. atrata*, Ziegler, *N. elata*, Hauff., and *N. nigrescens* and *N. fusca*, Kutschig.

Var. CARINATA, Kokeil. Fig. 7.

Cingulate form: last whorl spirally constricted, with carinated shoulder.

Var. SERRATILINEA, Ziegler. Fig. 8.

Transverse form: shell wide, with zigzag strigations, sometimes almost entirely black.

The synonyms are *N. lacustris*, Olivi, *N. Gardensis*, Stenz, *N. Benacensis*, Stenz, *N. Mantuana*, Porro, and *N. atra*, Parr.

Var. CHRYSOSTOMA, Kutschig. Fig. 9.

Golden mouthed form: larger, variously strigate, aperture golden yellow, posterior portion of columellar area blackish.

N. modesta, Küster and *N. incrustans*, Ziegl., are synonyms.

N. FLUVIATILIS, Linn. Pl. 15, figs. 10–25.

Shell transverse, rapidly enlarging, last whorl swollen, white, light green, pink, violet, grey or brown with transversely elongated or subtriangular spots of white, or darker zigzag strigations, sometimes irregularly banded; aperture bluish white or yellowish, showing the external markings by transparency, columellar margin edentulous. Diam. 6–12 mill.

Northern and Middle Europe: Great Britain, France, Holland, Germany, Russia, Norway and Sweden, Italy. Dalmatia.

This common European species is widely distributed in fresh water, its normal habitat, and occurs also in thermal and salt springs, in brackish and even in sea water. Its distinguishing character is its transverse form; the colors vary considerably, but the pattern is usually either transverse, nebulous light spots and streaks on a dark ground, or oblique dark zigzags on a light ground, the difference of appearance being due to the greater or less thickness and frequency of the dark markings. Fig. 15 represents a form from a salt stream; fig. 16 is a marine form from the Baltic coasts, known as *N. Baltica*, Beck, and which is *N. littoralis*, Linn. in part; fig. 17, the *N. thermalis* of Boubée (*N. Prevostiana*, Dupuy), occurs in thermal springs; figs. 18, 19 represent specimens from Southern France, described as *N. Parreyssii*, Villa, *N. Mittreana*, Recluz, *N. Reynesiana*, Paladilhe, *N. Pyrenaica*, Moquin-Tandon, and *N. zebrina*, Recluz; figs. 20, 21 are from Northern Italy, and have received the local names of *N. rhodocolpos*, Jan, *N.*

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trifasciata, *N. Ticinensis* and *N. intexta*, Villa; figs. 22, 23 are from Central Italy, including *N. pustulata*, Parr., *N. meridionalis*, Martens, *N. Orsinii*, Pecchioli; fig. 24, from Dalmatia, is *N. Dalmatica*, Partsch, *N. Diocletiana* and *N. guttata*, Küster, *N. Petteri*, Stentz, etc.; and fig. 25 is a South Russian form described as *N. dendritica*, Ziegler, *N. purpurata*, Parr., *N. subthermalis*, Bourg. etc. Among the general synonyms may be enumerated *N. lutetiana*, Montf., *N. Europæa*, Leach, *N. trifasciata*, Menke, *N. Porroi*, Stabile, *N. variabilis*, Hécart, *N. Bourguignati*, Recluz, ?*N. lacustris*, Linn., *N. fontinatis*, Brard, *N. halophila*, Klett, *N. Böttgeri*, Westerl., and vars. *dilatata*, Moquin-Tandon, and *elongata*, Broeck.

N. TRANSVERSALIS, Ziegler. Pl. 16, figs. 26, 27.

Shell obliquely transverse, slightly striulate, shining, greyish lead color, usually with three narrow dark bands. Diam. 10 mill.

Danube and tributaries, Bavaria, Austria, Hungary, Transylvania, etc.

It is *N. trifasciata*, Reeve, *N. trizona*, Zglr., and *N. radiata*, Lang.

N. DORIÆ, Issel. Pl. 16, fig. 28.

Thin, distinctly striate, shining, blackish, with zigzag lighter strigations, sometimes interrupted; aperture bluish white or yellowish. Diam. 6 mill.

Southern Persia, in warm springs.

N. LITURATA, Eichwald. Pl. 16, figs. 29, 30.

Transverse, yellowish to olivaceous, with oblique, more or less zigzag dark strigations, rarely replaced by small flecks irregularly arranged in bands. Diam. 5·5–7·5 mill.

Caspian, Aral and Black Seas.

It is *N. Danubialis*, Siemaschko, *N. fluviatilis*, Menetries, *N. serratilinea*, Hohenacker, and *N. pupa*, Pallas.

N. HELDREICHI, Schwerzenb. Pl. 16, figs. 31, 32.

Obliquely transverse, closely, slightly striate, light violaceous or greyish, reticulated with white and purple, with three ill-defined zones; aperture purplish, yellow-margined, columellar area flattened, minutely rugulose, bluish white. Diam. 7–11 mill.

Asia Minor, Candia.

N. VARIA, Ziegler. Pl. 16, figs. 33, 34.

Globosely subturbinate, slightly striated, shining, yellowish olive, with narrow red strigations, or white, red-bordered maculations;

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aperture diaphanous, showing the external markings, columellar area bluish, finely punctate. Diam. 6 mill.

Corfu, Cephalonia, perhaps also Dalmatia.

It is *N. rivalis*, Zglr., *N. picturata*, Jan, *N. lutescens*, Muhlf., *N. Baetica*, Mousson, *N. Salatana*, Zelebor.

N. MERIDIONALIS, Phil. Pl. 16, figs. 35–37.

Turbinate, with rather high spire, last whorl obliquely transverse, very smoothly striulate, a little shining, yellowish, with zigzag red, purple or black strigations, more or less confluent, so that the surface sometimes appears of the darker color, with flecks of the lighter; columellar area a little hollowed, very slightly rugulose, whitish, colored above. Diam. 8·5 mill.

Sicily.

The synonyms are *N. Philippii*, Recluz, *N. tessellata*, Ziegler.

Var. NIGROCÆRULEA, Parr. Fig. 37.

Smaller, slightly more globose, black, the markings obsolete. Diam. 7 mill.

Sicily, Algiers.

It is *N. nigrita*, Ziegl., *N. Prevostiana*, Benoit, and *N. Maresi*, Bourg. The latter from Algiers.

N. ELONGATULA, Morelet. Pl. 16, figs. 38–40.

Very obliquely transverse, slightly striulate, whitish or yellowish, with orange or purple zigzag or anastomosing lines, sometimes close enough to form a dark ground on which the lighter color appears as irregularly triangular specks; columellar area convex, white, lightly rugulose, callous and distinctly margined posteriorly. Diam. 6–12 mill.

Portugal.

N. Baetica, Sowb., *N. violacea* (fig. 39), *N. inquinata*, Morelet, and *N. lutesta*, Reeve (fig. 40), are synonyms. The latter appears to be very similar to *N. inquinata*.

N. HISPALENSIS, von Martens. Pl. 16, fig. 41.

Transversely globose, last whorl swollen, slightly rugose, orange-brown or light olivaceous, with close, subvertical, undulating or angulated black or dark brown strigations, sometimes interrupted; columellar area convex, minutely punctulate, greyish yellow, callous posteriorly. Diam. 7 mill.

Southern Spain.

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N. GUADIANENSIS, Morelet. Pl. 16, figs. 42–44.

Conoidal varying to globosely conoidal, olivaceous or yellowish, reticulated by purplish or blackish lines, with sometimes rather broad purple bands; columellar area minutely punctate, rugulose, yellowish or bluish. Diam. 6·5–10 mill.

Southern provinces of Spain and Portugal.

The typical form, with usually reticulated coloring is that shown by fig. 42, and of this *N. Anatensis*, Recluz is a synonym; *N. Velascoi*, Graells (fig. 44), is one extreme of variation, being more globose, and dark banded, and *N. Valentina*, Graells (fig. 43), is the other extreme, narrowly conoidal, a little constricted, and also dark banded.

N. HIDALGOI, Crosse. Pl. 17, figs. 54–56.

Suboval, thin, not shining, white, interruptedly, obliquely, longitudinally streaked or reticulated with narrow black lines, sometimes with three black bands; whorls rapidly increasing, convex; aperture yellowish, translucent, showing the external bands, columellar area yellowish grey. Alt. 5, diam. 3 mill.

San Julian River, near Jativa, Eastern Spain.

N. CALLOSA, Desh. Pl. 16, fig. 45.

Smooth, subglobose, white, reticulated with black lines, often forming spiral bands, and faint or vanishing in the interspaces, sometimes covering the whole surface, without bands.

Diam. 8 mill.

Morea.

N. PREVOSTIANA, Partsch. Pl. 16, fig. 46.

Subglobose, striulate, shining, black, last whorl sometimes subangulated; columellar area slightly rugulose, white. Diam. 8 mill.

Austria, Hungary.

N. Hungarica, Küster, is a synonym.

N. BAETICA, Lam. Pl. 16, fig. 47.

Shell closely striulate, a little shining, brownish black, with scarcely visible spiral black lines; columellar area flat, rugulose, somewhat narrow, distinctly circumscribed, ash-colored.

Diam. 6 mill.

Northern Spain, Southern France.

N. SARDOA, Menke. Pl. 16, figs. 48, 49.

Rugosely striulate, opaque, black, often unicolored, more rarely closely undulatingly longitudinally strigate or maculated with

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white; columellar area plane, rugulose, bluish white, blackish behind, distinctly arcuately circumscribed. Diam. 5–6·5 mill.

Isl. of Sardinia.

N. gymnocephala, Küster is a synonym.

N. PELOPONNESIA, Recluz. Pl. 16, fig. 50.

Rugosely striulate, blackish violaceous, with transversely oblong white maculations; columellar area white, a little wrinkled, narrow, flat, aperture brownish grey. Diam. 8 mill.

Central Greece.

It is *N. Baetica*, Desh., and *N. melanoleuca*, Küster.

N. NUMIDICA, Recluz. Pl. 16, figs. 51, 52.

Varying from semiglobose to transversely semiovate, rugosely striulate, purplish black, with white dots, or yellowish reticulated with black; columellar area plane, slightly rugulosely scabrous, bluish white. Diam. 6–9 mill.

Algeria.

The transverse form recalls *N. fluviatilis*, Linn. The synonyms are *N. Baetica*, Morelet, *N. algira*, Kuster, *N. fluviatilis*, Poiret, *N. Prevostiana*, Terver.

N. SYRIACA, Bourg. Pl. 17, fig. 53.

Transversely semiovate, slightly rugosely striate, black, sometimes with minute white spots; columellar area plane or a little concave, slightly rugulose, bluish. Diam. 6 mill.

Beirut, etc., in Syria.

N. PALLIDA, Dunker. Pl. 17, fig. 57.

Lightly striulate, greyish yellow, nearly unicolored; columellar area plane, very slightly rugulose, whitish. Diam. 4 mill.

Persepolis, Persia.

It is *N. Schirazensis*, Parr.

N. SCHULZII, Grimm. Pl. 17, figs. 58–60.

Quadrately semiglobose, rugosely striate, light yellowish; body whorl depressed above and obtusely biangulated, aperture subquadrate, the peristome continuous, columellar margin plane, punctate-rugulose, yellowish white. Diam. 7 mill.

Caspian Sea.

This shell has much the appearance of a Pileopsis; fig. 60 is probably from an abnormal specimen.

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N. PANAYANA, Recluz. Pl. 17, fig. 61.

Lightly striulate, light yellowish olivaceous, with dark purple or blackish zigzag strigations, often subreticularly confluent; aperture and columellar area bluish, the latter slightly rugulose.

Diam. 9 mill.

Philippine Is.

N. BACONI, Reeve. Pl. 17, fig. 62.

Spire subexserted, obtuse, whorls convex, striate, shining, columellar area subcallous; ash color, reticulated or flexuously lineated with black. Diam. 14 mill.

Swan River, Australia.

N. NILOTICA, Reeve. Pl. 17, figs. 63, 64.

Conically semiglobose, smooth, a little shining, ash colored, with numerous close subundulating purplish black strigations; columellar area plane, yellowish white. Diam. 8 mill.

Nile River.

It is *N. arctilineata*, Recluz, and *N. Africana*, Parreyss and Reeve (fig. 63), not Recluz, also *N. Dongolensis*, Ehrenb.

N. EUPHRATICA, Mousson. Pl. 17, fig. 65.

Somewhat solid, striulate, yellowish ash color, with close, rather wide zigzag blackish or dark violaceous strigations; last whorl obtusely subangulated above, columellar area bluish white, circumscribed posteriorly by a semielliptical line. Diam. 6 mill.

Samava, Lower Euphrates.

N. JORDANI, Sowb. Pl. 17, figs. 66, 67.

Ovate-conoidal, more or less constricted, striulate, solid, whitish, with subconfluent, flexuous black strigations; aperture bluish white, columellar margin slightly sinuated, obsoletely denticulated, area plane, yellowish behind. Diam. 7·5–14 mill.

River Jordan.

Fig. 67 represents a less compressed shell which may connect this species with the preceding.? *N. Aleppensis*, Recluz, and var. *turris*, Mousson, are synonyms.

N. ANATOLICA, Recluz. Pl. 17, figs. 68–71.

Semiglobose, a little shining, lightly striulate, sometimes with fine spiral sculpture, convex, often obtusely angulated, suture deep, black, or more rarely violaceous with spiral black bands or longitudinal wide strigations; columellar margin edentulous, area plane, bluish white. Diam. 5–10 mill.

Asia Minor, Syria, Palestine, Rhodes, Scio, etc.

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The synonyms are *N. Jordani*, var. *nitida*, Recluz, *N. nigrita*, Ziegler, *N. nitida*, Parr., *N. interposita*, Mouss. I follow von Martens in designating four varieties for convenience only; their characters have no permanence.

Var. BELLARDII, Mouss. Fig. 71.
Larger, black, subangulated.
N. Schirazensis, Bourg. is a synonym.

Var. HAUSKNECHTI, Martens. Fig. 68.
Size moderate, obsoletely angulated, fulminately strigate.

Var. OLIVIERI, Martens. Fig. 70.
Size moderate, rounded, light violaceous, spirally banded.

Var. BELLADONNA, Mousson. Fig. 69.
Small, rounded, subdilated, black.
It is *N. Trojana*, Charp., and var. *Boissieri*, Martens.

N. MACRII, Recluz. Pl. 17, figs. 72–74.
Globosely ovate, a little shining, lightly striulate, unicolored black, rarely fulminately strigate on a lighter color; columellar area convex, whitish, margin edentulous.
Asia Minor, Syria, Palestine.
Has not the spiral striæ which rather indistinctly mark *N. Anatolica*. The synonyms are *N. Karasuna*, Mouss., and *N. Michonii*, Bourg.

N. MESOPOTAMICA, Mousson. Pl. 17, fig. 75.
Lightly striulate, shining, black, usually unicolored, rarely maculated with white, whorls scarcely convex, the last somewhat flattened above, wider below; aperture bluish white, columellar area rather wide, plane, minutely rugulose, margin finely denticulate.
Diam. 6·5–7 mill.
Upper Mesopotamia.
Described as a variety of *N. meridionalis*, and at first considered by Martens a variety of *N. Anatolica*.

N. CINCTELLA, Martens. Pl. 17, fig. 76.
Lightly striulate, somewhat shining, greenish olivaceous or blackish, last whorl tumid below the suture, then constricted, base wider; aperture bluish white, columellar area convex, greyish, margin minutely denticulate. Diam. 4·5 mill.
Upper Mesopotamia.

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Lives in same region as the preceding form, but is said to be constantly distinguished by its constricted whorl.

N. PEROTTETIANA, Recluz. Pl. 17, fig. 77.

Shell globose, striulate, black, unicolored, whorls scarcely three, the last tinged at the suture; aperture bluish white, columellar area plane, narrow, middle of the margin obtusely denticulate.

Diam. 9–11 mill.

India, Ceylon, Pegu?.

N. tristis, Phil. is a synonym.

N. COLUBER, Thorpe. Pl. 17, fig. 78.

Undescribed, and only a single figure published, showing the back. It is yellowish green, with black zigzag markings, and (if not enlarged) is 15 mill. diam.

Ceylon.

N. JAYANA, Recluz. Pl. 17, fig. 79.

Thin, concentrically striulate, epidermis yellowish, with reticulate, flexuously angulated lines, mixed with small white spots; suture narrowly channeled; inner lip maculated with black, aperture yellowish. Diam. 6 mill.

An undetermined species sent by Dr. Jay of N. York to Recluz, and therefore doubtfully ascribed to North America. I believe that no one has recognized it; it almost certainly is an old-world species.

N. SHOWALTERII, Lea. Pl. 17, figs. 81, 82.

Smooth, diaphanous, yellowish corneous, whorls 3, rapidly increasing, suture inconspicuous, last whorl somewhat inflated, aperture bluish white, edentulate, peristome continuous, forming a posterior raised margin which limits the rather wide columellar area, area smooth, slightly concave. Diam. 5·5 mill.

Coosa River, Alabama.

Several specimens were obtained, all without the operculum. It has been suggested that this is a young Anculosa, but it has not the characters of that group; on the contrary, it more nearly approaches in general *Neritina crepidularia*. The coloring of the epidermis more nearly resembles Anculosa however, than the other fluviatile species of Neritina.

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Unfigured and undetermined Species of Theodoxus.

N. SAULCYI, Bourg. *Athens.*
N. MAROCCANA, Palad. (Figure inaccessible to me). *Morocco.*
N. LURIDA, Jan. (Perhaps = *Littorina obtusata*, L.). *Antilles.*
N. EUXINA, Clessin. *Dobrudscha.*

Section NERITILIA, Martens. 1879.

N. SUCCINEA, Recluz. Pl. 17, fig. 83.

Obliquely elliptical, striulate, thin, yellowish, or yellowish corneous; columellar area plane, very slightly rugulose, margin edentulous. Diam. 3·3–4·5 mill.

Guadeloupe, W. I.

N. CONSIMILIS, Martens. Pl. 18, fig. 86.

Obliquely elliptical, slightly, closely striulate, a little shining, diaphanous, corneous yellow, spire blackish; columellar area slightly convex, and faintly rugulose, blackish, margin edentulous.

Diam. 3·3 mill.

Mauritius.

The shell is scarcely distinguishable from that of *N. succinea*, but the operculum of the former is reddish, that of *consimilis* transparent, but appearing black when the animal is enclosed.

N. RUBIDA, Pease. Pl. 17, fig. 84; Pl. 18, fig. 85.

Transversely ovate, thin, translucent, lightly striulate, yellowish corneous, usually more or less incrusted with black (epidermal?); columellar area nearly plane, ash-colored, margin edentulous.

Diam. 5 mill.

Central Polynesia.

N. ossea, Garrett, is a synonym.

N. MANOELI, Dohrn. Pl. 18, fig. 87.

Obliquely turbinate, lightly striulate, thin, corneous yellow, partly incrusted with black (epidermal?); columellar area yellowish white, margin straight, edentulous. Diam. 4 mill.

Prince's Isl., W. Africa.

Section SMARAGDIA, Issel. 1869.

N. VIRIDIS, Linn. Pl. 18, fig. 88.

Obliquely ovate, dorsally compressed, smooth, shining, bright green, varying to yellowish green, more or less interruptedly strigate or maculate with white, or sometimes with black; columellar

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area greenish white, convex, wide, margin sinuate and minutely dentate. Diam. 7·5 mill.

Florida, West Indies, Mediterranean Sea.

It is *N. pallidula* (DaCosta), Risso, *N. Feuilletii*, Audouin.

N. Rangiana, Recluz. Pl. 18, figs. 89–92.

Somewhat less oblique than *N. viridis*, usually with a subangulated shoulder on the body whorl, greenish, occasionally varying to yellow or rose color, with short white flames below the suture, and spiral bands formed of longitudinal white lines, occasionally coallescing, or absent, and sometimes intermingled with reddish spots in spiral series; columellar area convex, wide, white, margin distinctly toothed. Diam. 8 mill.

Red Sea, Indian Ocean, Madagascar, Mauritius, Philippines, Australia.

I think that the unfigured *N. puella*, Gould, from the Loo Choo Is., and *N. viridissima* (figs. 91, 92), of Tapparone Canefri, fall within the range of variation in form and color usually attributed to *N. Rangiana*. The latter is a New Guinea species.

N. Souverbiana, Montrouzier. Pl. 18, figs. 93–97.

Smooth, shining, corneous yellow, variously longitudinally strigate, fasciculated, or reticulated with black lines, sometimes interrupted to form spiral bands, and three or four spiral series of white maculations; columellar margin sinuate and minutely denticulated, area convex. Diam. 5–7 mill.

New Caledonia, New Guinea, Pt. Jackson, Australia.

It is *N. semen*, Tapparone-Canefri (figs. 96, 97), *N. pulcherrima*, Angas (figs. 94, 95).

It is possibly only a variety of *N. Rangiana*.

Var. Hellvillensis, Crosse.

Besides the brown or black strigations and white maculations, there are two or three orange bands.

N. Paulucciana, Gassies. Pl. 18, figs. 98, 99.

Moderately thick, shining, white, yellowish or light pink, distantly or closely reticulated with red or black, sometimes with spiral bands; aperture yellowish, columellar margin edentulous, area subgranular. Diam. 4·5 mill.

New Caledonia.

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N. SUAVIS, Gassies. Pl. 18, figs. 100, 1.

Obliquely ovate, striulate, shining, translucent, yellowish or reddish, with narrow red and black bands; aperture reddish, showing three bands, columellar margin obscurely dentate. Diam. 6 mill.

Loyalty Is. (near N. Caledonia).

N. GLABRATA, Sowb. Pl. 18, figs. 2–5.

Obliquely ovate, rather solid, smooth, shining, yellowish or corneous, with obliquely longitudinal black strigations often reticulated, or sometimes with spiral black or reddish bands; columellar area convex, white, margin obscurely dentate. Diam. 5–7 mill.

Gambia, Liberia, West Africa.

N. Webbei, Recluz, is a synonym.

Unfigured and undetermined Species.

N. MATONIA, Risso. *Mediterranean.*

N. miliacea, Recl. is a synonym.

N. ORNATA, C. B. Ad. (? = *N. viridis*). *Jamaica.*

The color is pale greenish or livid brown, ornamented with numerous rather small irregular spots of bright red; there are crowded spiral microscopic lines; the columellar lip is obsoletely toothed. Operculum divided into two concave regions by an acute ridge, which is curved in the direction of the growth.

Section STANLEYA, Bourg. 1885.

N. NERITOIDES, Smith. Pl. 17, fig. 80.

Imperforate, rather thin, smooth; whorls 4, convex, subolivaceous, with spiral brownish lines; columella callous, edentulous.

Diam. 5, alt. 6·5 mill.

Lake Tanganyika, Africa.

Unfigured Species.

N. GIRAUDI and N. SMITHIANA, Bourg. *Lake Tanganyika.*

Section CLYPEOLUM, Recluz. 1850.

N. PULLIGERA, Linn. Pl. 18, figs. 10, 11, 6–9, 12, 13; Pl. 19, figs. 14–19, 22, 24.

Lightly striate, outer lip raised into a ridge above, epidermis dark brown, sometimes nearly black, or olivaceous, obsoletely or faintly minutely dotted with black; aperture yellowish with a deep

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orange band parallel with the outer lip, columellar area flattened, polished, very minutely punctate, greyish black varying to yellowish olivaceous, edge very minutely dentate. Diam. 40 mill.

East Indies, Australia, Central Polynesia.

N. rubella, Müller, *N. larga*, Hombr. et Jacq. (fig. 9) *N. conglobata*, Martens (figs. 22, 24), and vars. *sulcata*, T. Woods, and *subcanalis*, Mouss. are synonyms.

Var. KNORRI, Recluz. Figs. 16–18.

Smaller than *N. pulligera*, body whorl without the sutural ridge, but extending over the spire, which it completely covers, epidermis jet black, unicolored; aperture bluish with an orange band within the margin, columellar area violaceous, the edge minutely toothed. Diam. 28 mill.

E. Africa, Mozambique to Madagascar; Ins. Labuan, near Borneo?

It is *N. Beckii*, Sowb., (fig. 17), and *N. cryptospira*, Martens (fig. 18), from the last named locality.

Var. CANALIS, Sowb. Figs. 6, 7.

Epidermis black, or very dark brown punctate or minutely reticulated with black; aperture varying from bluish to yellowish, columellar area yellow becoming reddish orange posteriorly, edge very minutely dentate, or smooth. Diam. 20–30 mill.

Australia, New Caledonia, Viti Is.

Typically distinguished by its strong sutural ridge and intervening channel, but from this character insensibly merges into the parent form; the coloring of the columellar region also, varies to that of *N. pulligera* through intermediate shades.

N. bicanalis, Phil. is a synonym.

Var. OVALIS, Sowb. Fig. 8.

More transverse, with terminal apex, spirally striated, aperture yellowish, deepening to orange color on the columellar area, edge very obscurely crenulated. Diam. 25 mill.

Tahiti.

Var. PETITII, Recluz. Figs. 12, 15, 19.

Striate, body whorl somewhat extended above, but not covering the spire, and appressed, not ridged, dark brown, faintly black-spotted, varying to black; aperture and columellar area yellowish to orange, columellar edge minutely dentate or smooth. Diam. 30–40 mill.

Indo-Australian, Central Polynesian.

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N. Californica, Reeve (fig. 13), *N. expansa*, Gassies (fig. 14), *N. Bruguierei*, Recluz (fig. 15), of which *N. Dunalii*, Montr. Mss., *N. cirrata* and *N. circinata* Philippi, are synonyms, and *N. Lenormandi*, Gassies (fig. 19), may all be placed here.

N, SQUAMIPICTA, Recluz. Pl. 19, figs. 27, 20, 21, 23, 25–27.

Striate, shining, yellowish olivaceous to brownish, nebulous, or with reticulations or biangular markings of black lines, varying from minute to large, sometimes intensified into bands, sometimes absent or only apparent here and there, last whorl appressed and enveloping the spire; aperture bluish white to olivaceous, columellar area slightly punctate, flattened, yellowish white or pale olivaceous, margin minutely dentate. Diam. 25–35 mill.

Philippines, Moluccas.

I think it not unlikely that this form will prove to be only a color variety of *N. pulligera*, from which it is distinguished mainly by its lighter color and more prominent and diversified markings. Like that species it has its varieties depending upon the appression or erection of the sutural edge, color of interior, etc; and as in that species, so far as these differences have caused separate names to be given them, I have treated them as varieties–simply for convenience.

This form is *N. pulligera*, Quoy and Gairnard, *N. Delestennei*, Recluz.

Var. BECKII, Recluz. Figs. 20, 21, 25.

Lip raised into a sutural ridge above, columellar area greyish black. It is *N. Knorri*, Reeve (fig. 25), *N. Brandti*, Phil. of which *N. cornuta*, Reeve (Figs. 20, 21) and its Var. *Pacifica*, Mousson are synonmys.

Var. IRIS, Mousson. Fig. 23.

Spire subimmersed beneath the last whorl, yellowish olive, conspicuously reticulated with brown or black; aperture bluish, yellow around the margin, columellar area purple-red, edge numerously dentate. Diam. 18–30 mill.

Malaysian Archipelago.

The synonyms are *N. Knorri*, Sowb., *N. testudinea*, Hombr. et Jacq. *N. Delesserti*, Recluz.

Var. SANGUINEA, Sowb. Fig. 26.

Flexuously striate, upper part of body whorl appressed to and enveloping the spire, olive yellow, reticulately mottled with black;

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aperture yellowish, with marginal border of blood red, the latter color extending over the columellar area, edge edentulous.

New Ireland, on stones in mountain streams.

N. POWISIANA, Recluz. Pl. 19, figs. 28, 29.

Last whorl partially enveloping the spire, raised into a ridge towards the aperture, yellowish olivaceous, reticulated or spotted with black, sometimes faintly banded with violaceous upon which are nebulous light spots; aperture and area olive yellow, columellar margin edentulous. Diam. 20 mill.

New Ireland, on stones.

Var. IMMERSA, Martens. Fig. 29.

Pale violaceous with darker bands, with white, black-bordered triangular markings; aperture yellowish.

Japan?

N. ASPERULATA, Recluz. Pl. 19, figs. 30, 31; Pl. 20, fig. 32.

Whorls very rapidly increasing, somewhat flattened above a very obsolete shoulder-angle, spire minute, but visible, not raised, spirally and longitudinally somewhat roughly striate, the spiral lines impressed, olivaceous brown, transversely reticulated with black, epidermis thin, rough, not shining, aperture bluish white to light yellowish, columellar margin edentulous. Diam. 16–25 mill.

East Indies, N. Caledonia, Philippines.

I think that *N. arcifera*, Mörch (fig. 32), will prove synonymous, or at most a variety with somewhat more prodnced spire.

N. PENNATA, Born. Pl. 20, fig. 33.

Semiglobose, slightly striate, somewhat shining, olivaceous or brownish with subtriangular black spots often in oblique series; aperture and columellar area yellowish to orange color, margin concave, numerously minutely toothed. Diam. 16–25 mill.

East Indian Archipelago.

N. piperina, Chemn. is the young of the species.

N. HIEROGLYPHICA, Wattebled. Pl. 20, fig. 34.

Conically globose, solid, shining, scarcely striulate longitudinally, brownish olivaceous, with zigzag dark brown or blackish markings; aperture and columellar area bluish white or slightly yellowish, columellar margin concave, minutely dentate.

Diam. 22, alt. 34 mill.

Annam.

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N. PORCATA, Gould. Pl. 20, fig. 35.

Equally, closely plicate, epidermis dark brown with inconspicuous black reticulations, varying to entirely black, last whorl appressed on the spire, which is partially covered; aperture yellowish with a deeper zone around the margin, columellar area flattened, minutely punctate, yellow, deepening into orange red posteriorly, margin minutely dentate. Diam. 18–27 mill.

Viti and Samoan Is.

It is *N. Solomonensis*, Reeve, *N. Gräffei*, and Var. *frondosa*, Mousson.

N. SULCULOSA, Martens. Pl. 20, fig. 36.

Closely spirally engraved, striulate, dark olivaceous brown, without markings; aperture bluish ash color, columellar margin sinuated, distinctly rather strongly dentate, area plane. Diam. 14 mill.

Ins. Flores, E. of Java.

Is *N. spiralis*, Martens, not Reeve.

N. PUNCTULATA, Lam. Pl. 20, figs. 37–41.

Nearly smooth, the striæ of growth fine and inconspicuous, last whorl enveloping the spire, light brown, sometimes with a violet tinge, varying to black, covered throughout with close light colored suboval spots; aperture bluish white, varying to light yellowish, columellar area wide, flattened, minutely punctate, yellowish grey, edge minutely dentate. Diam. 20–30 mill.

West Indies, Central America, New Grenada, Bay of Montija, Panama to Mazatlan.

Probably inhabits the sea as well as fresh water; some of the specimens have the spire extensively eroded. The distributiou on both shores of the American continent is singular, but is well-established. The species need not be confounded with *N. virginea*, Linn., as has been done; in its spire-enveloping body whorl and other characters it is very distinct from that species, and completely indentified with the present group.

The principal synonym is *N. cassiculum*, Sowb. (fig. 39), which von Martens by an erroneous reference to Sowerby's illustrations has referred to *N. reclivata*, Say; other synonyms are *N. fuscilabris*, Wiegmann; and *N. aperta*, Budgin. I think that to these may probably be added *N. Bahiensis*, Recluz (fig. 40), from Brazil, and *N. turbida*, Morelet (fig. 41), from Central America—both of them young shells.

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N. AFRA, Sowb. Pl. 20, figs. 42–44.

Very slightly striulate, spire somewhat prominent, partially enveloped by the last whorl, yellowish olive to brown or nearly black, reticulated with black, often forming obscure spiral bands; aperture bluish white, columellar area yellowish brown, flattened, the margin finely toothed. Diam. 15–20 mill.

West Coast of Africa.

As in most similarly marked species, the interspaces of the reticulations sometimes have the appearance of nebulous spots on a dark surface. The synonyms are *N. æquinoxialis*, Morelet, *N. Listeri*, Reeve (figured), *N. Africana*, Recluz, *N. rubricata*, Morelet (figs. 43, 44), and *N. Calabarica*, Mousson.

N. FRASERI, Reeve. Pl. 20, fig. 45.

Olive black, longitudinally ridged-striate, spire but little exserted; aperture bluish white, columellar margin sinuous and minutely dentate in the middle, area flattened, yellowish. Diam. 14 mill.

West Africa.

This species is unknown to me.

N. SANDALINA, Recluz. Pl. 20, figs. 46–48.

Growth striæ crossed by very faint impressed lines, last whorl obtusely shouldered, slightly concave above the shoulder, more or less enveloping the rather high spire, brown to black, sometimes obscurely reticulated; aperture and columellar area bluish white or yellowish, columellar margin sinuous and dentate in the middle.

Diam. 16–22 mill.

Sandalwood Bay, Malaysian Archipelago, Viti Is. etc.

N. cholerica, Gould (fig. 47), *N. Vanicorensis*, Hombr. (fig. 48), and *N. Caffra*, of Garrett are synonyms. There is but little difference between this species and *N. propinqua*, Mousson in the appearance of the shell: the latter has not columellar teeth.

N. ADUMBRATA, Reeve. Pl. 20, fig. 49.

Last whorl a little depressed around, but not enveloping the spire, smooth, shining, yellowish olivaceous to brown, closely or coarsely reticulated with black, or appearing nebulous on a darker ground; aperture bluish white, columellar area flattened, posteriorly orange brown, edge slightly sinuous and minutely dentate in the middle.

Diam. 18–30 mill.

Solomon's Is.

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More elevated, brighter color, and not enveloping the spire like the preceding species.

N. MARCHIONATA, Reeve. Pl. 20, fig. 50.

Rather thin, orbicular, shining, body whorl concavely impressed next the spire, with conspicuous waved yellowish and black strigations, sometimes nebulous; aperture yellowish, somewhat expanded, columellar area rather narrow, the edge minutely toothed.

Diam. 22 mill.

Marquesas Is.

Unfigured Species.

N. TRUNCATA, Sganzin.	*Madagascar.*
N. RARA, Dufo.	*Seychelles.*
N. ROSSMASSLERIANA, Recluz.	*Hab unknown.*

Section NERITONA, Martens. 1869.

N. LABIOSA, Sowb. Pl. 21, fig. 53.

Semiglobose, last whorl partially enveloping the spire, expanded at the aperture, rugosely striate, olive brown, with short black transverse markings; aperture large, peristome subcontinuous with the posterior margin of the columellar area, lip and area yellowish white to deep orange color, the margin edentulous. Diam. 35–50 mill.

Celebes, Philippines.

For operculum, see description of the section, p. 7.

N. PLANISSIMA, Mousson. Pl. 21, figs. 54, 55.

Oval, depressed, striulate, olivaceous, somewhat rough; aperture bluish, columellar area orange tinted, the margin edentulous, peristome subcontinuous. Diam. 28 mill.

Mts. in Navigator's Is.

Unknown to me, but appears very closely related to the preceding species.

N. MACGILLIVRAYI, Reeve. Pl. 21, figs. 56, 57.

Depressed auriform, usually more or less eroded, smooth, brownish olivaceous; peristome subcontinuous, columellar area deep orange color, margin arcuate in the middle and edentulous, aperture bluish.

Diam. 29 mill.

Port Carteret, Solomon Is.

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N. GRANOSA, Sowb. Pl. 21, figs. 51, 52.

Much depressed, covered with warts throughout, arranged somewhat in quincunx order, rayed on the sides; aperture bluish white, radiated and speckled with darker short lines and spots, columellar area whitish or more or less tinged and colored with yellow, varying to reddish orange. Diam. 30–45 mill.

Sandwich Is.

N. papillosa, Jay and *N. gigas*, Lesson are synonyms.

Subgenus CLITHON, Montfort. 1810.

When the spines are developed, as they usually are, there is no difficulty in determining these shells; but occasionally the same species is spineless, and even some of the species referred here appear to never develope spines, in which cases they are only separable from Clypeolum by the characters of the operculum.

N. LONGISPINA, Recl. Pl. 23, figs. 3–5.

Epidermis varying from rather dark brown to nearly black, the lighter colored specimens often with black lines and bands, surface plicately rugose, with a series of long, cylindrical spines on the shoulder; aperture bluish white, showing the exterior bands, columellar area flattened, smooth, usually whitish or posteriorly tinged with yellow, terminated by a distinct rounded line, margin incurved in the middle and edentulous or minutely dentate.

Diam. 15–30 mill.

Mauritius, Isle of Bourbon, Rodriguez, Madagascar.

It is *N. corona*, Linn. in part, *N. coronata*, Leach.

Var. MAURITIANA, Morelet. Fig. 5.

Spines not developed. *N. despinosa*, Mouss. is a synonym.

N. SPINOSA, Budgin. Pl. 23, figs. 6, 7.

Rather smooth, with a few wrinkles, shining, light yellowish brown with irregular black spiral bands, and a corona of moderately long, subcylindrical black spines; aperture bluish white, showing the bands, columellar area flattened, distinctly circumscribed posteriorly, often tinged with yellowish, deepening into reddish-orange behind, margin a little incurved but scarcely dentate in the middle.

Diam. 15–20 mill.

Taheiti.

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N. undata, Lesson, and var. *inermis*, Martens (fig. 7), are synonyms, the latter for specimens in which the spines are broken or not well developed; but I have never seen a specimen without some indication of their presence.

N. SOULEYETANA, Recluz. Pl. 23, figs. 8, 9.

Rather smooth, shining, black, with white or yellowish, more or less interrupted and undulated longitudinal strigations, shoulder subangulated, with distant rather short, somewhat stout spines, aperture yellowish or bluish white, columellar margin incurved and very faintly minutely dentate in the middle. Diam. 13–20 mill.

Marquisas Is., *New Ireland*, *Moluccas*, etc.

Small specimens entirely devoid of spines are of frequent occurance. *N. Recluziana*, Guillou (fig. 10), *N. hapa*, Hombr. et Jacq., and *N. rarispina*, of the same authors, *N. nigrispinis*, Lesson, and var. *Studeriana*, Martens are synonyms.

Var. KERAUDRENII, Le Guillou.

The strigations replaced by numerous small rounded or subtriangular yellowish or whitish spots.

N. Armstrongiana, Hinds is a synonym.

N. MADECASSINA, Morelet. Pl. 23, fig. 11.

Slightly striate, somewhat plicately folded, yellowish or olivaceous, more or less variegated in spots or bands, or uniformly reddish brown, with a more or less defined shoulder, sometimes unarmed but usually cord-like with an occasional short spine; aperture bluish white or yellowish white, slightly sinuous on the middle of the columellar margin—which is minutely dentate throughout.

Diam. 15–21 mill.

Madagascar.

It is *N. corona Bengalensis*, Chemn., but does not inhabit the neighborhood of Bengal.

N, DIADEMA, Recluz. Pl. 23, figs, 12–15.

Lightly striulate, smooth, shining, yellowish olivaceous, occasionally pale violaceous, with white, black-bordered subtriangular spots, shouldered, with usually moderately long spines, sometimes scarcely developed; aperture whitish or bluish white, columellar edge minutely dentate. Diam. 12–16 mill.

East Indies, Philippines.

N. aranea and *N. cryptospina*, Mousson are synonyms.

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Var. SPINIFERA, (Recluz) Sowb. Fig. 14.

Reticulated with reddish brown. It is very doubtful whether this is the *spinifera* of Recluz.

Var. DONOVANA, Recluz. Figs. 12, 13.

With subvertical flexuous reddish or blackish strigations.

N. strigillata, Canefri is a synonym.

Var. CELEBENSIS, Mousson.

With alternate orange and black spiral bands, the orange ground with triangular black-margined yellowish spots.

N. BREVISPINA, Lam. Pl. 23, figs: 16–18; Pl. 24, figs. 19–28, 31–34.

Rugosely plicate, and usually very irregularly subgranular, often unarmed, or with a shoulder somewhat shortly spinose, yellowish brown, with granules whitish, varying to darker brown or nearly black, sometimes obscurely maculated or indistinctly banded, sometimes pinkish under the epidermis; aperture yellowish or bluish white, columellar edge usually edentulous in large specimens, minutely faintly dentate in small ones. Diam. 1 in.

East Indies to Central Pacific.

A very common, widely distributed form which rejoices in an extensive synonymy. It is *N. corona*, Linn. in part (figs. 16, 20.) *N. spinosa*, Wood, *N. variabilis*, Lesson, *N. cardinalis*, Guillou, *N. Montacute*, Recluz, *N. musiva*, *N. flexuosa*, and *N. corrugata*, Hombr. et Jacq., *N. subgranosa*, (figs. 17, 18) and var. *mutica*, Sowb., *N. squarrosa*, Recluz, (figs. 25, 26), *N. ruida*, Mousson, *N. squamosa* (Recl.) Sowb., *N. Pritchardi*, Dohrn (fig. 23),—with which may be united *N. aspera*, Phil., *N. deltoidea*, Garrett and var. *Vitiana*, Mousson, *N. rugata*, Recluz (figs. 27, 28), and its var. *monilifera*, Marts., in which granules tend to unite into longitudinal plicæ.

Var. ANGULOSA, Recluz. Figs. 21, 22.

Irregularly longitudinally plicate, blackish olivaceous, usually with minute yellowish spots, which are sometimes black margined, sometimes replaced by short black lines, spines scarcely developed on the shoulder.

Typically, this form seems very distinct, but it passes into *brevispina* by intermediates; one of these is *N. obscurata*, Recl. others are *N. discors*, Mart. (fig. 24), and *N. ruginosa*, Recl. (figs. 31, 32),—of which *N. aspersa*, Recl. (fig. 33), *N. humerosa*, Mousson *N. subrugata*, Baird. (fig. 34) are synonyms.

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N. RHYTIDOPHORA, Tapparone-Canefri. Pl. 24, figs. 29, 30.

With elevated, obliquely longitudinal rugæ, olivaceous green, or light greenish pink, with undulating brown or black lines, sometimes evanescent, and sometimes with a submedian black spiral band; aperture light yellowish or brownish grey, columellar area brownish, shining, very minutely rugulose, margin centrally incurved and finely toothed. Diam. 15 mill.

Ins. Sorong, N. Guinea.

N. THERMOPHILA, Martens. Pl. 24, figs. 35, 36.

Plicately striate, olivaceous brown, with occasional yellowish maculations, sometimes black-margined, occasionally triseriate, slightly shining, peristome yellowish within, sub-thickened, columellar margin obtusely dentate in the middle, upper tooth much larger, area slightly rugose, orange-yellow. Diam. 6·5 mill.

Isl. New Britain.

Only known to me by the description and figure, but appears not unlike a spineless *N. brevispina.*

N. HÆMASTOMA, Martens. Pl. 24, fig. 37.

Striulate, olivaceous brown, with small yellowish, black-margined spots; aperture bluish white, columellar margin slightly incurved in the middle, with a few indistinct teeth on the upper part of the sinus, area plane, scarlet. Diam. 26·5 mill.

Philippines.

Described from a single specimen.

N. CHLOROSTOMA, Brod. Pl. 24, figs. 38, 39; Pl. 25, fig 62; Pl. 26, figs. 83–85.

Smooth, somewhat shining, greyish, varying to violaceous, light brown or black, with numerous, usually minute white dots and spots which, when the ground color is light, are black-margined, sometimes indistinctly darker banded; aperture whitish, yellow, olivaceous etc, columellar margin scarcely sinuous in the middle, edentulous, or obscurely dentate, area plane, smooth, often tinged with yellow posteriorly. Diam. 7–12 mill.

Marquesas, Harvey, Cook's, Samoan and Viti Is. etc.

The synonymy includes *N. pisiformis*, Recluz, *N. siderea*, Gould, (fig. 83), *N. parvula*, Guillou, *N. tristis*, Reeve, (fig. 85), *N. lentiginosa*, Reeve, (fig. 62), *N. dispar*, Pease, (fig. 84), *N. Harveyensis*, Mousson, *N. paludosa*, Garrett, Ms.

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N. RETROPICTA, Martens. Pl. 24, figs. 40, 41.

Closely striulate, subopaque, olivaceous, with subtriangular yellow markings, bordered on the basal margin with black, aperture bluish or yellowish, columellar margin sinuated and obtusely dentate in the middle, area light greyish yellow, slightly rugulose.

Diam. 14–17 mill.

Southern Japan, Siam, Viti Is.

I suspect that this will prove a variety of the preceding species. The synonyms are *N. obtusa*, Reeve, (fig. 41), *N. nubila*, Martens, and *N. obscura*, Dunker.

N. CASTANEA, Hombr. and Jacq. Pl. 24, fig. 42.

Minutely flexuously striulate, somewhat sharply so above, dark brown, with black zigzag longitudinal lines, so obscure that they are not usually visible except when the surface is wetted, epidermis of last whorl appressed to and partially or entirely covering the spire; aperture bluish white, columellar margin slightly sinuous, and scarcely dentate in the middle, area flattened, minutely punctate and rugose. Diam. 15–18 mill.

Samoa and Caroline Islands.

N. propinqua, Mousson is a synonym.

N. RETUSA, Morelet. Pl. 24, figs. 43, 44.

Subrugosely striate, soiled olivaceous, with scarcely visible brownish maculations, with short spines on the shoulder in the young state which are mostly lost in the adult; aperture yellowish white, the columellar area becoming orange color behind, edge sub-emarginate in the middle and minutely dentate. Diam. 12 mill.

New Hebrides.

N. SOWERBYANA, Recluz. Pl. 24, fig. 45; Pl. 25, figs. 46–51.

Solid, subopaque, closely, faintly striate, shining, yellowish brown, orange brown or rosy, frequently with minute white and red spots, sometimes more or less interruptedly banded or longitudinally strigate with black; aperture usually bluish white, columellar margin dentate for most of its length. Diam. 10–15 mill.

Gulf of Siam, China, Japan, Philippines.

Great as is the typical difference between this species and *N. brevispina*, Lam., I have specimens before me which seem to establish a passage between that species and the granular, spineless form of the latter, *N. pulchella*, (figs 50, 51), Recluz, and *N. Sowerbii*, Reeve, (figs. 48, 49), are synonyms.

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N. AVELLANA, Recl. Pl. 25, figs. 52–55.

Solid, irregularly striate, subopaque, somewhat shining, olive grey, yellowish or orange-red, with articulated black bands; aperture bluish white, columellar area minutely punctate, the margin sinuous in the middle, and obsoletely dentate.

Borneo, Formosa, Philippines.

I fear that this will prove synonymous with the preceding species. The synonyms are *N. dubia*, Issel (=var. *Isseliana*, Martens) and vars. *petholata*, and *chlorosticta*, Martens.

N. FABA, Sowb. Pl. 25, figs. 57–60.

Solid, irregularly striulate, shining, yellowish or reddish, more or less interruptedly strigate or reticulated with chestnut or black, sometimes black-banded; aperture bluish white, columellar margin scarcely sinuous in the middle, obsoletely dentate.

Diam. 15 mill.

Western part of the Indian Archipelago, Singapore, etc.

My only specimens of this species, types from its author, strongly indicate identity with *N. Sowerbyana*. *N. Baliensis*, Mousson, and the color-varieties *strigosa*, *sagittata* and *fasciata*, Martens are synonyms.

N. INTERRUPTA, Recluz. Pl. 25, fig. 56.

Solid, striulate and occasionalty subplicate, yellowish, with fine olivaceous somewhat anastomosing longitudinal lines, often interrupted partially, to form lighter colored spiral bands, young shells frequently and old ones occasionally with several short spines above; aperture bluish or yellowish, the columellar margin dentate nearly throughout, with stronger teeth at the extremities of a central sinus, area subrugose and minutely punctate, usually tinged with bluish black behind; often the base of the shell has a jet-black fasciole.

Diam. 9–16 mill.

Philippines; *New Caledonia.*

Von Martens considered the species of Recluz a synonym of *N. avellana;* on the contrary it appears to possess all the characters of the more recently named New Caledonian *N. nucleolus*, Morelet, (fig. 63). *N. plicata*, and *N. Pazii*, Gassies, and var. *spinifera*, Martens are synonyms. The unfigured *N. costulata* and *N. Artensis* of Gassies, likewise New Caledonian, are probably to be added.

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N. RARISPINA, Mousson. Pl. 25, figs. 65, 66.

Striate, dark greenish, minutely punctulate with black, last whorl obtusely angulated, and obsoletely or shortly spinose; aperture bluish, columellar area rather narrow, plane, margin with a dentate median sinus. Diam. 6–9 mill.

Java.

According as the shell is with or without spines, Mousson has made varieties *spinosa* and *destituta*,—which, of course, have no varietal value. The species itself has not been identified.

N. TRITONENSIS, Guillou. Pl. 25, fig. 61.

Greenish, with arcuate longitudinal yellowish lines, spire entirely eroded, flat; aperture oblique, with a rather narrow, flat area, its margin subarcuate, unidentate, lip rounded, depressed above.

Triton Bay, New Guinea.

The above is a copy of the original description—which was not illustrated. The figure is from Reeve, and I cannot believe that it pertains to the same species; it looks more like *N. chlorostoma*, Brod.

N. BICOLOR, Recl. Pl. 25, figs. 68, 67, 69; Pl. 26, fig. 75.

Shell plicate-striate, the body whorl enveloping the spire, somewhat shining, closely finely strigate with alternate yellowish and olivaceous green, sometimes minutely punctate with the lighter color upon the darker, as though serrating the margins of the strigations; aperture bluish white, columellar area flattened, subrugose, margin slightly incurved and faintly dentate in the middle, the curve bounded by a stronger tooth above. Diam. 15–27 mill.

East Indies to Philippines.

It is *N. celata*, Recluz, (fig. 69), *N. subpunctata*, Recluz, (fig. 67), *N. rugata*, Souleyet, *N. rugosa*, Bush, *N. punctifera*, Mousson, and varieties *glandiformis*, *Molluccensis* and *tricolor* of Martens—the latter with reddish brown rugæ and a basal zone of the same, with elongate triangular diaphanous yellowish maculations. I have not seen this variety, nor has it been figured except a section showing coloring, but I can scarcely believe it to belong here—the pattern is more like *N. avellana*. Finally in *N. Wallisii*, Mousson (fig. 75) =*N. rugata*, Gallies, we have a sparsely spinose form which appears to connect very closely with the spinose form of the next species.

N. OLIVACEA, Recluz. Pl. 26, figs. 71, 72: Pl. 25, fig. 70.

Smooth, slightly striate, dark olivaceous varying to brownish with obscure black undulating lines, often obsolete, occasionally with one

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or two short spines above, but mostly without them; aperture bluish white, columellar area flattened, subrugose, sometimes bounded by a callous orange-brown fasciole, edge incurved in the middle and dentate there, and slightly so above the curve. Diam. 15–24 mill.

Moluccas, Philippines, Viti Is.

N. inconspicua, Busch is a juvenile, and *N. subocellata*, Schepmann (fig. 70). a spinose specimen; other synonyms are *N. solium*, Recluz, =*N. dolium*, Rve., (fig. 72). I suspect that this will, after all, prove a smooth form of *N. bicolor*, Recluz. Mousson has described a var. *Vitiana.*

N. FLAVOVIRENS, Busch. Pl. 26, figs. 76, 77.

Lightly striulate, shining, greenish with yellow, black-margined maculations, sometimes a few spines at the suture; aperture bluish-white, columellar margin with a denticulate sinus, terminated by a larger tooth above and below, area convex, very slightly punctate rugulose, Diam. 15 mill.

Java, Borneo, etc.

The synonyms are *N. emergens*, Mouss., *N. Cochinsinæ*, Recluz, *N. cyanostoma*, Morelet (fig. 77).

N. SPINIPERDA, Morelet. Pl. 26, fig. 78.

Uniform olive green, roughly longitudinally ridged, ridges sometimes articulated, young shells with an obtuse shoulder bearing an occasional short spine; aperture bluish or livid white, columellar area callous, dilutely maculated with orange color or greyish green, margin arcuated and dentiulated, with a median larger tooth and another below. Diam. 18 mill.

Ins. Nossi-be, near Madagascar.

Perhaps a variety of *N. bicolor*, Recluz.

N. FULIGINOSA, Busch. Pl. 26, fig. 79.

Plicately striate, shining, olivaceous brown, with numerous pallid dots scarcely visible; aperture whitish, black-bordered; columellar area white, plane, faintly rugose, margin arcuate and dentate in the middle, with a larger tooth above and below. Diam. 13–15 mill.

Batavia.

N. Bataviensis, Mousson, is a synonym.

N. ACULEATA, Gmelin. Pl. 26, figs, 80, 81.

Shell with revolving ridges elevated into nodes and short spines, olivaceous brown; aperture bluish white with yellowish bands, col-

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umellar margin slightly concave, multidentate, area flattened, minutely punctate. Diam. 18–25 mill.

Indian Archipelago.

It is *N. squamæspina*, Mousson and *N. sulcata*, Nyst.

N. CIRCUMVOLUTA, Recluz. Pl. 26, fig. 82.

Smooth, fulvous, or pink, with minute white maculations, with two or three spiral black bands articulated with white; aperture bluish white, the columellar margin slightly arcuate and minutely dentate in the middle, with a stronger tooth at either extremity. Diam. 18 mill.

Ins. Negros, Philippines; on stones in a mountain stream.

N. LUCTUOSA, Recluz. Pl. 26, fig. 86.

Shell small, smooth, greyish, with close undulating black strigations; columellar area plane, narrow, whitish defined on the middle and base by a semicircular line, margin slightly arcuate in the middle, the tooth above the sinus prominent. Diam. 3·5–7 mill.

New Guinea, Norfolk Island.

N. PEGUENSIS, Blanford. Pl. 26, fig. 87.

Striulate, shining, greenish or yellowish olivaceous, sometimes indistinctly darker banded, covered with minute white dots, shaded in front with brown or black; aperture bluish white, columellar area bluish grey, slightly corrugated, margin slightly sinnous in the middle, the sinus and above it minutely toothed, with a stronger tooth between. Diam. 14 mill.

Irawadi River, Pegu, Burmah.

It is *N. fuliginosa*, Theobald.

N. RETIFERA, Benson. Pl. 26, figs. 88, 89.

Lightly striulate, yellowish olivaceous or greenish, with oblique angulated reddish or blackish lines, sometimes forming a coarse reticulation; aperture bluish white, columellar margin incurved and minutely dentate in the middle with a stronger tooth at the top, area somewhat convex, wide, whitish. Diam. 9–12 mill,

Calcutta, Madras.

The synonyms are *N. Michaudi*, Recluz, (fig. 89) *N. reticularis*, Sowb., *N. capillulata*, Gould, of Sowb., *N. Mörchiana*, Frauen., *N. humeralis*, Theob. Perhaps *N. fulgetrum*, Reeve (Pl. 12, fig. 30) which I have described on p. 38, and for which no habitat is given, should also be referred here.

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N. DRINGII, Recluz. Pl. 26, figs. 90, 91.

Rather thin, whorls obliquely rugulose, with yellow bands on a blackish ground, sometimes obliquely longitudinally strigate with black or brownish and yellow; aperture bluish, tinged with yellow around the margin and on the columellar area, columellar margin subarcuated and dentate in the middle. Diam. 12 mill.

Hanover Bay, N. Australia.

N. FLEXUOSA, Gassies. Pl. 26, fig. 92.

Oblique, flexuous, striulate, scarcely shining, thin, yellowish olivaceous, somewhat anatomosely strigate with longitudinal black lines, sometimes obscurely yellowish banded; aperture yellowish, columellar area bluish white, flattened, subpunctate, margin sub-incised, with a superior, rather strong tooth. Diam. 5, alt. 7·5 mill.

New Caledonia.

N. UNIDENTATA, Recluz. Pl. 26, fig. 93.

Thin, olivaceous, with oblong, oblique yellowish maculations, last whorl a little angulated and flattened above; aperture yellowish green near the margin, columellar lip narrow, whitish, its margin with a single superior tooth, and scarcely arcuated.

Diam. 12 mill.

Taheiti.

Sometimes a short spine occurs at the superior angle of the lip. The species has not been recognized.

N. COMORENSIS, Morelet. Pl. 26, figs. 94, 95.

Solid, irregularly striulate, not shining, greenish grey; brown-spotted; aperture grey or greyish brown, columellar area plane, yellowish, the margin with one to three obtuse denticles.

Diam. 9 mill.

Comoro Is.

Unfigured species, probably belonging to Clithon.

N. RARISPINA and N. LESLONI, Recluz. *Sicily.*

The locality is doubtless erroneous.

N. GUTTATA, Recluz. *New Guinea.*

N. PFEIFFERIANA, Recluz. *New Ireland.*

N. BOURGAINVILLEI, Recluz. *Samoa Is.*

N. DACOSTÆ, Recluz. *Philippines.*

N. MENKEANA, Recluz. *Taheiti.*

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N. TROSCHELI, Recluz. *Hab. unknown.*
N. CORONOIDES, Lesson. *New Guinea.*
N. PENICILLATA, Gould. *New Ireland.*

Subgenus NERIPTERON, Lesson, 1830.

In the diagnosis of this group (p. 8), the columellar margin is stated to be edentulous, but this is in fact, only occasionally the case; usually there are traces of teeth, and sometimes they are very distinct, although small.

N. AURICULATA, Lam. Pl. 21, figs. 58–63.

Rather convex, slightly striate, somewhat shining, brownish or olivaceous, obsoletely reticulated with black lines or with lighter spots; aperture yellowish white, bluish black around the lip and on the columellar area, margin of columella a little arcuate in the middle, and minutely or obsoletely toothed. Diam. 15–25 mill.

Ceylon, East Indies, Philippines, Viti Is.

It is *N. subalata*, Recluz, *N. subauriculata*, Recluz (fig. 60), *N. rostrata* (figs. 61, 62), and *N. Layardi* (fig. 63,), Reeve, as well as var. *inaurita*, Mörch.

N. RUBICUNDA, Martens. Pl. 21, figs. 64, 65.

Convex, very slightly striulate, yellowish brown or chestnut, unicolored, a little shining; aperture ash color, peristome reddish, columellar margin minutely multidentate, area large, a little rugose, slightly convex. Diam. 12 mill.

Kapera River, Borneo, on floating timber.

Supposed to differ from the preceding species by its small size, want of reticulated markings, etc. I think it will prove identical.

N. TAHITENSIS, Lesson. Pl. 21, figs. 66, 67.

Striate, and spirally slightly engraved with subdistant lines, light olivaceous brown, without markings; aperture greyish blue or yellowish grey, columellar margin slightly sinous and minutely dentate in the middle, columellar area slightly rugose and minutely punctate. Diam. 19–25 mill.

Ins. Taheiti, Samoan Is., Sandwich Is.

The synonyms are *N. auriculata*, Sowb., *N. Lamarckii*, Desh., *N. marginata*, Hombr. and Jacq., *N. vespertina*, Nuttall (Pl. 22, fig. 71), and *N. Sandwichensis*, Reeve (Pl. 22, fig. 73).

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Von Martens separates *N. vespertina* on account of a slight difference in convexity of whorls, and habitat, but in the large series before me from both Taheiti, and Sandwich Is., the supposed local peculiarities disappear.

N. CHRISTOVALENSIS, Reeve. Pl. 21, figs. 68, 69.

Convex, striulate, yellowish, with spiral bands of reddish chestnut markings; aperture yellowish, columellar area slightly arcuate and minutely dentate in the middle. Diam. 19 mill.

San Christoval, Solomon's Is.

N. BICANALICULATA, Recluz. Pl. 21, fig. 70.

Rather depressed and somewhat widely winged; olive brown, rather closely reticulated and sometimes banded with reddish chestnut; aperture bluish white clouded or changing to greyish yellow, columellar margin without teeth, area minutely punctate.

Diam. 15–20 mill.

Philippines, Viti Is.

The ears are usually broader than in the specimen figured, but the depressed form and markings are pretty constant in the series before me. It is *N. biauriculata*, Recl.

N. LECONTEI, Recluz. Pl. 22, figs. 74, 75, 76.

Very convex, with numerous elevated close spiral lines, olivaceous brown, spirally more or less lineated with black; aperture lead color or yellowish grey; columellar margin incised, minutely and regularly dentate in the middle, area rugose and minutely granular.

Diam. 1 in.

New Caledonia.

N. Novæ-Caledonica, Reeve, (fig. 76) is a synonym.

N. ACICULATA, Mörch. Pl. 22, figs. 77, 78.

With small, distinct, obliquely lateral spire, closely radiately striated, dark olivaceous, unicolored; columellar margin arcuate and dentate in the middle. Diam. 17 mill.

Nicobar Is.; Sumatra?

It is *N. navicularis*, Mörch (undescribed).

N. MARMORATA, Brazier. Unfigured. *New Guinea.*

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Section ALINA, Recluz, 1842.

N. CARIOSA, Gray. Pl. 22, figs. 79–81.

With distinct growth lines, and sometimes engraved spiral striæ, body whorl convex, swollen, dilated into wings above and below, spire visible, flattened, epidermis black or very dark brown, with numerous close minute yellowish spots, sometimes scarcely visible; aperture bluish, sometimes yellowish, columellar margin scarcely arcuate in the middle and slightly dentate, terminating with a larger superior tooth. Diam. 18–25 mill.

Sandwich Is.

In young specimens the wings are often not developed, and then the shell would scarcely be taken for a member of this group. Von Martens changes the name to *N. Sandwichensis*, Desh. because he thinks that Gray's figure should be referred to *N. Mauritii*. Lesson; I do not agree with him: the figure appears to me to be decidedly that of the present species. Other synonyms are *N. Nuttalli*, Recluz. *N. convexa*, Nuttall, *N. solidissima*, Sowb., *N. lugubris*, Phil., *N. perstriata*, Mousson, *N. tristis*, Phil., *N. affinis*, Recluz., (=*N. lugubris*, Sowb. fig. 83.)

N. MAURITII, Lesson. Pl. 22, fig. 82.

Rather more depressed than the preceding species, with the wings larger and more dilated, somewhat rugose, epidermis black, unicolored; aperture bluish white, columellar margin minutely dentate in the middle. Diam. 18 mill.

Mauritius, Ins. Bourbon, Mas Karene Is., E. coast of Madagascar.

It is *N. auriculata*, Sowb., *N. alata*, Robillard, *N. Deshayesii*, Pease, *N. Sandwichensis*, Desh,

N. LIFOUANA, Gassies. Pl. 22, fig. 84.

Spirally striulate, shining, light yellowish, unicolored, translucent; aperture yellowish white, columellar margin with about five minute teeth in the middle. Diam. 18 mill.

New Caledonia.

I have not seen this species.

N. DILATATA, Brod. Pl. 22, figs. 85, 86.

Shell broadly winged, rather regularly striulate, yellowish olive, sometimes with three indistinct spiral pink bands, covered through-

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out with zigzag black reticulations; aperture bluish white or yellowish grey, columellar margin slightly arcuate and dentate in the middle. Diam. 16 mill.

Taheiti, in streams.

N. navicellina, Guillou, *N. florida*, Recluz are synonyms. Von Martens refers here *N. Owenii*, Wood's Index Test. Suppl. t. 8, f. 16, but it appears to me to belong to the next species.

N. LATISSIMA, Brod. Pl. 22, fig. 87–89.

Finely striulate, with produced but broadly rounded ears, olivaceous or brownish black, reticulated with black or triangularly marked with numerous light, black margined spots; aperture bluish or yellowish grey, columellar margin a little concave, scarcely incurved but minutely dentate in the middle. Diam. 20–37 mill.

West coast of Central America.

The synonyms are *N. globosa*, Brod., *N. intermedia*, Sowb. (fig. 89).

Var. PILSBRYI, Tryon. Pl. 22, fig. 91.

A color variety characterized by a purplish or pink very fine reticulation upon a white ground, upon which are numerous subtriangular white spots with dark margins.

Var. FONTAINEANA, d'Orb. Pl. 23, figs. 92, 93.

Smoothish, olivaceous, reticulated with black, with one or two greenish or blackish zones. Less winged than the type.

Guayaquil, Equador.

It is *N. Guaquilensis*, Sowb. (fig. 94.)

N. OWENIANA, Gray. Pl. 22, fig. 90.

Slightly, closely striulate, yellowish or brownish olivaceous, with a small or large reticulating pattern of black lines, often forming triangular light spots, last whorl usually enveloping the spire; aperture bluish white to greyish yellow, showing the external pattern, columellar margin nearly straight, edentulous, or obscurely, minutely dentate in the middle. Diam. 18–25 mill.

West coast of Africa; Ins. Fernando Po, Cape Palmas.

N. CRISTATA, Morelet. Unfigured. *Gabon, W. Africa.*

N. ALATA, Brod. and Sowb. *Taheiti.*

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Subgenus Dostia, Gray, 1840.

N. crepidularia, Lam. Pl. 23, figs. 95–99.

Very convex, lightly striulate, sometimes unicolored, varying from light yellowish, or olivaceous to blackish, but usually reticulated, checkered or spotted with a light color on a dark ground or dark on a light ground, frequently the darker tint is violaceous, and sometimes it is reddish; aperture bluish, bluish grey, yellowish grey etc., peristome continuous, columellar area slightly rugose, margin a little arcuate and dentate in the middle. Diam. 15–25 mill.

Indian Ocean, India to Malay Archip., China, Philippines, New Caledonia.

The form is pretty constant, but the coloring exhibits considerable variation, within rather narrow limits, however; not sufficient to excuse the immense synonymy. It is *N. violacea*, Gmel. in part, *N. purpurea* and *N. gracilenta*, Budgin, *N. concentrica*, *N. plumata* and *N. mitrula*, Menke, *N. intermedia*, Desh., *N. cornucopiæ*, and *N. depressa*, Benson, *N. melanostoma*, Troschel, *N. Indicæ* and *N. Touranensis*, Souleyet, *N. Siquijorensis*, *N. exaltata*, and *N. pileolus*, Recluz, *N. Schlæflii* and *N. compressa*, Mousson, and *N. Montrouzieri*, Gassies.

N. Lifuensis, Angas. Unfigured. *Viti Is.*
N. lacustris, Jan. Unfigured. *Brazil.*

Unassigned species described as Neritinæ.

N. pygmæa, C. B. Adams. *Jamaica.*
N. pusilla, C. B. Ad. *=Teinostoma.*
N. neglecta, Pease. *Sandwich Islands.*
N. minima, Recluz. *Nukahiva.*
N. Hessei, Böttger. *Mouth of River Congo, W. Africa.*

Genus NAVICELLA, Lam., 1809.

Section Cimber, Montfort, 1810.

The shells of the Navicellæ are modified in form and convexity according to the nature of the surface to which they adhere; thus the form called *N. lineata*, is a *N. tessellata*, higher and laterally compressed from inhabiting the stems of sea-weed, whilst the typical *N. tessellata* is from surfaces giving the shell a chance to spread; so

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also the projection of the apex varies so that it may reasonably be considered as effected by environment; again, the central projection of the septum, usually conspicuous in *N. Freycineti*, is sometimes wanting in that species, whilst it occasionally occurs in others. Thus the sectional characters (made subgeneric by Messrs. Adams), insensibly coalesce. As to coloring, certain patterns have been regarded as characteristic of species, but there appear to be no breaks in the modifications by which most of the species may be connected.

In the interest of scientists (and so, perhaps, of science) it becomes necessary to set up some arbitrary landmarks, be they varieties, species or sections, it matters not, for the recognition of certain stages of the variations else in unbroken progresssion, and to these stages the names given by naturalists at a time when species were entities have been applied. This task Dr. von Martens has performed as well as his opportunities, learning and experienced judgment permitted: if I have succeeded in making any improvement, it is due to having his work as a foundation.

N. Borbonica, Bory. Pl. 27, figs. 2–12.

Rather convex, apex small, somewhat attenuated, produced beyond the posterior margin; color varying from dark chestnut brown, unicolored to light olivaceous brown, or tinged with purple and marked with radiating reticulations, interior bluish or blackish, the posterior margin usually with a long black stain on either side.

L. 25–40 mill.

Mauritius, Ins. Bourbon, Madagascar, Seychelles Is.

It is *N. elliptica*, Lam., (fig. 3) *N. tabernaculata*, Montf., *N. porcellana*, Recluz, not Linn., *N. Cookii*, Recluz (figs. 4, 5), *N. bimaculata*, Reeve (fig. 6), var. *triloba*, Martens=*N. apiata*, Sowb. in part (fig. 7), *N. livida*, Rve. (fig. 9), very similar to var *triloba*, var. *compressa*, Martens = *N. affinis*, Reeve (fig. 8). I do not separate as such the two varieties given by Dr. von Martens, because such forms occur in all the species and are the result of station upon the growth of the individual. The black markings which Reeve has commemorated in his name bimaculata are very usually, but not always present, and unfortunately occur in other species. A more depressed form has been treated by von Martens as a distinct species, but seems to connect insensibly with *Borbonica*; it is called *N. depressa*, Lesson, (figs. 10, 11), and *N. zebra*, Lesson, *N. haustrum*, Reeve (fig. 12) and

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its var. *fissa*, Mousson, *N. hupeana*, Gassies and *N. affinis*, Mousson are referred to it as synonyms. It occurs from New Caledonia to Tahiti.

Both *N. borbonica* and the form *depressa* have been referred to *N. porcellana*, Linn., but that species, devoid of epidermis, must remain unrecognizable.

Morelet has figured (Jour. de Conch., Oct. 1887) a color variety from the Comoros Is. It is large, and bimaculate with vermillion inside in young as well as adult individuals.

N. MACROCEPHALA, Guillou. Pl. 27, figs. 13–16.

Convex, laterally compressed, beak much produced, large, worn away below, epidermis dark chestnut color, with somewhat rugose growth lines. L. 25–35 mill.

New Caledonia to Viti Is.

N. sanguisuga, Reeve (figs. 13, 14), *N. scarabæus*, Reeve (figs. 15), and its var. *decapitata*, Mousson, and *N. magnifica*, Reeve (fig. 16), with its var. *truncata*, Mousson, are synonyms. *N. parva*, Mousson (Pl. 28, figs. 23, 24), from the Malay Archipelago appears to have no distinctive character, except its much smaller size: I think it is identical.

N. SCULPTA, von Martens. Pl. 27, fig. 17, 18.

Elliptical, lateral margins compressed, beaks large, dark chestnut color, without markings, distinctly longitudinally, granularly lirate. L. 13 mill.

Sumatra.

N. LUZONICA, Souleyet. Pl. 27, fig. 19.

Chestnut brown, rather smooth and somewhat shining, very minutely radiately reticulated, the markings barely visible except on the beak; convex, beak narrow, recurved, projecting beyond the margin. L. 20–40 mill.

Celebes, Philippines, Marquesas Is., etc.

The insufficient distinction of this species rests on the fineness of its reticulating dark lines. *N. crepiduloides*, Reeve (Pl. 28, fig. 20), = var. *compressa*, Martens (Pl. 28, fig. 21) and var. *adspersa*, Martens (Pl. 28, fig. 22) are synonyms.

N. BOURGAINVILLEI, Recluz. Pl. 28, figs. 25, 26.

Broadly elliptical, chestnut color or yellowish olivaceous, with a large pattern of radiating, transverse, black reticulations. L. 20–30 mill.

New Caledonia to Viti Is.

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The synonyms include *N. macrocephala* of Sowb. and Reeve (figs. 27, 28), *N. Freycineti*, Gould, *N. Caledonica*, Morelet, *N. affinis*, Gassies, *N. ornata*, Adams and Angas, *N. undulata*, Mousson, *N. squama*, Mousson, and *N. nana*, Montr. (juvenile).

N. CUMINGIANA, Recluz. Pl. 28, fig. 29.

Olivaceous yellow with irregular concentric greenish brown or blackish bands and reticulations. L. 15–30 mill.

Philippines.

The undulating, transverse alternate series of light and dark colored stripes give character to this species; it is scarcely as convex as *N. Bourgainvillei.*

N. JANELLA, Recluz. Pl. 28, figs. 30–33.

Broadly ovate, laterally somewhat produced, convex, with high, narrow, recurved beak, olivaceous yellow, with numerous, close radiating strigations of greenish black, sometimes coalescing, smooth, shining. L. 30–45 mill.

Philippines, Marianne Is., Moluccas.

N. lentiginosa, Reeve (fig. 33) is a synonym.

N. LAPEROUSEI, Recluz. Pl. 28, fig. 34.

Convex, elliptical, with compressed sides, chestnut color, with here and there a black longitudinal strigation, sometimes forking, postero-lateral margins of the lip black stained. L. 18–25 mill.

Marianne, Guam, Ponape Is.

Will probably prove a variety of *N. macrocephala*, Guillou.

It is *N. elliptica*, Quoy.

N. LUTEA, Martens. Pl. 28, figs. 35, 36.

Broadly oval, convex, epidermis thin, yellowish, without markings, apex reddish, interior light greyish. L. 17·5 mill.

Viti Is.

Subsection PARIA, Gray, 1867.

N. FREYCINETI, Recluz. Pl. 28, figs. 37–41.

Oval, convex, yellowish brown, varying to chestnut color, divergently radiated and coarsely reticulated with black; septum truncately produced in the middle. L. 17–35 mill.

New Hebrides to Viti Is.

The synonyms are *N. pala*, Mousson and its var. *Vitiensis*, Mouss., var. *compressa*, Martens, which includes *N. suffreni*, Recl., *N. psittacea*, Reeve (figs. 40, 41), and *N. pala*, var. *profunda*, Mouss.

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N. JUNGHUHNI, Herklots. Pl. 28, figs. 42, 43.

Sub-rotund, smooth, shining, convex, dark olivaceous brown, the apex often purplish, with undulating transverse black lines, rest of surface without markings; septum a little produced in the middle. L. 30–35 mill.

Java.

Section ELARA, H. and A. Adams, 1854.

N. SUBORBICULARIS, Sowb. Pl. 29, fig. 44.

Rounded oval, rather elevated, apex elevated and recurved, intermarginal, a little oblique, epidermis yellowish green, varying to olivaceous brown, the lighter colored specimens sometimes purple tinted above, with triangular radiating markings or irregular radiating blackish strigations. L. 20–30 mill.

Andaman, Is., to Java, and Philippines.

The synonyms are ? *N. porcellana*, Linn., *N. picta*, Schum, *N. elliptica*, Blainv. (in part), *N. orbicularis*, Reeve (figs. 45, 46), *N. squamata*, Dohrn, *N. Javanica*, Mouss., *N. Forstenii*, Herklots, *N. Urvillei*, Recluz, and its vars. *Gaimardi* and *Quoyi*, Recluz, and *N. pulcherrima*, Tapparone-Canefri. I am also compelled to unite with this species *N. variabilis*, Recluz, (figs. 47, 48); typically it is somewhat higher and more elliptical in outline, but shades away in both respects: *N. Schmeltziana*, Mousson, is a synonym of it.

Philippines, Viti Is.

N. APIATA, Guillou. Pl. 29, fig. 49.

Obovate, apex high, blunt, olivaceous yellow, variegated with black, so as often to form large tear-like radiating blotches of the lighter color. L. 25–32 mill.

Marquesas to Viti Is.

N. TESSELLATA, Lam. Pl. 29, fig. 57.

Subelliptical or oblong, rather depressed, spire narrow, recurved, not terminal, thin, not much shining, olivaceous yellow, tessellated with purple brown or black, with obscure rays, varying to olivaceous or purplish brown, with a few short radiating lines and minute spots of white. L. 18–30 mill.

Ceylon, Java to Philippines.

The synonymy includes *N. clypeolum*, Recluz (figs. 50–52), *N. Recluzii*, and *N. variabilis*, Reeve (fig. 53, 54), *N. ambigua*, Recluz, *N. atra*, Reeve, *N. radiata*, Reeve, var. *subrostrata*, Martens, and its

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synonyms *N. pulchella* (fig. 56) and *N. insignis*, Reeve (fig. 55), var. *oblonga*, Martens, and its synonym *N. maculifera*, Mousson, var. *compressa*, Mart., and its synonym *N. Entrecasteauxi*, Recl., (fig. 59) *N. reticulata*, Reeve (fig. 62), including, *N. eximia*, Reeve (fig. 61) and its var. *compressa*, Martens (fig. 67), of which *N. Livesayi*, Dohrn is a synonym, and *N. cærulescens*, Recl. (figs. 63, 65), with its synonyms *N. plumbea*, Sowb., *N. compressa*, Benson, and *N. orientalis*, Reeve (fig. 66).

Section STENOPOMA, Gray, 1867.

N. LINEATA, Lam. Pl. 29, fig. 58.

Shell compressed elliptical, light yellowish, with a radiating pattern of chestnut or purplish longitudinal reticulations, forming tessellations and triangular markings of the lighter color, very thin, translucent, interior showing all the exterior markings, light bluish or yellowish. L. 25 mill.

Philippines, Viti Is.

Von Martens unites this species with *N. tessellata*, Lam., and I have no doubt that he is correct, but the latter might with equal propriety be united with *N. suborbicularis*, etc.: in fact, the characters in this group anastomose in every direction.

N. navicula, Fér., and *N. picturata*, Garrett (fig. 60) are synonyms: in the latter the ground color varies from yellow to pale purple, and the tessellations are often replaced by distinct radiating bands.

Unfigured species of Navicella.

N. APONOGETONIS, Vahl. *East Indies.*

N. EXCELSA and N. MORELETIANA, Gassies. *New Caledonia.*

These two have the interiors only, figured, and those have no characters.

FAMILY *NERITOPSIDÆ.*

Genus NERITOPSIS, Grat, 1832.

N. RADULA, Linn. Pl. 29, fig. 68.

Shell opaque, thick, white, with thick, close, beaded, spiral ribs, the narrow interstices pitted; outer lip fluted by the ribs.

Alt. ·75–1·5 inch.

Singapore, Java, Mauritius.

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Family *ADEORBIIDÆ.*

Genus ADEORBIS, S. Wood, 1842.

A. PLANA, A. Ad. Pl. 30, figs. 69, 70.

Much depressed, last whorl obliquely flattened, broad, spirally striated, umbilicus very large, its wall spirally flattened, aperture wide, oblique, white. Diam. 12 mill.

Philippines, Japan.

A. ELEGANS, A. Adams. Pl. 30, fig. 71.

White or yellowish white, depressed, closely striate and with impressed spiral lines, last whorl obliquely flattened in front, umbilicus large, its wall rounded, aperture wide, obliquely subtriangular.

Diam. 10–12 mill.

Ins. St. Thomas, W. I.

A. DEPRESSUS, A. Ad. Pl. 30, fig. 72.

Much depressed, broad, smooth, last whorl not obliquely flattened above, umbilicus moderate white. Diam. 4 mill.

Mino-Sima, Japan.

A. STRIATELLA, Montr. Pl. 30, figs. 73, 74.

Spirally striate with impressed lines and suboblique curved lines of punctations, white, subtranslucent, shining, umbilicus narrow, spire somewhat elevated, aperture transversely oval.

Diam. 5·5 mill.

New Caledonia.

A. ORBELLA, A. Ad. Pl. 30, fig. 75.

White, moderately depressed, with somewhat elevated spire, whorls sloping above, umbilicus very large, defined, aperture obliquely rounded. Diam. 4 mill.

Mino Sima, Japan.

A. CLAUSUS, A. Ad. Pl. 30, fig. 76.

Finely concentrically striated, translucent, spire convexly depressed, whorls somewhat flattened above, umbilicus partly covered by callus. Diam. 3 mill.

Mino-Sima, Japan.

A. JAPONICUS, A. Ad. Pl. 30, fig. 77.

Depressed, smooth, semipellucid, concentrically obliquely striated, whorls slowly increasing, rounded, with impressed suture, umbilicus wide, bordered by a strong rib. Diam. 2·5 mill.

Gotto Is., Japan.

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A. ADAMSI, Fischer. Pl. 30, fig. 78.

Convexly depressed, with sharp spire, sinuously concentrically striate, umbilicus rather wide, aperture wide, obliquely oval.

Diam. 4 mill.

Guadeloupe, W. I., Cedar Key, Fla.

A. SEGUENZIANUS, Tryon. Pl. 30, fig. 79.

White, widely umbilicated, whorls very oblique, spire elevated, suture impressed, microscopically striate, with intermediate spiral lines, last whorl very oblique, umbilicus surrounded by an obtuse angle of the base. Diam. 4 mill.

Italy, Sicily; 11–108 fms.

Seguenza describes this species as *A. depressus*, preoccupied by A. Adams.

A. FRAGILIS, G. O. Sars. Pl. 30, fig. 80.

Thin, fragile, whitish, or slightly brownish, spire elevated, regularly spirally striate, whorls convex, with deep suture, last whorl obliquely flattened above, aperture obliquely ovate, patulous, umbilicus large, defined by an obtuse angle. Diam. 2 mill.

Loffoden Isl.; W. coast of Norway; 60–190 fms.

A. PROMINULA, A. Ad. Pl. 30, figs. 81, 82.

Umbilicus moderate, slightly bordered; thinly concentrically striate, translucent, polished, whorls scarcely prominent, rapidly increasing, aperture obliquely rounded. Diam. 2 mill.

Mino-Sima, Japan.

A. MANULA, A. Ad. Pl. 30, fig. 83.

Moderately umbilicated, depressed, subdiscoidal, the spire a little exserted, whorls rounded, slowly increasing, umbilicus bordered, aperture rounded. Diam. 2·5 mill.

Mino-Sima, Japan.

A. TROCHULA, A. Ad. Pl. 30, fig. 84.

Umbilicus small, defined by a rib, spire rather elevated, trochiform, the whorls sloping above, periphery bluntly angulated, aperture rather round. Diam. 3·5 mill.

Gotto Is., Japan.

A. PATRUELIS, A. Adams. Pl. 30, figs. 85, 86.

Semipellucid, white, spire slightly elevated, last whorl sloping above, obtusely triangular, rather flattened below, umbilicus somewhat narrow, columellar lip erect. Diam. 3 mill.

Mino-Sima, Japan.

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A. SUBANGULATUS, A. Ad. Pl. 30, figs. 87, 88.

Umbilicus narrow, defined by an angle, rather solid, last whorl gibbous and obscurely angular near the suture, outer lip sinuously produced above. Diam. 3 mill.

Gotto Is., Japan.

A. SINENSIS, A. Ad. Pl. 30, figs. 89, 90.

Depressed, solid, opaque, spire slightly elevated, decussated by minute concentric and spiral striæ, whorls rounded, umbilicus rather large, aperture nearly round. Diam. 3 mill.

China Sea.

A. NITIDUS, A. Ad. Pl. 30, figs. 91, 92.

Whorls rounded, with impressed suture, spire slightly elevated, umbilicus large, defined by an angle, aperture nearly round. Diam. 3·5 mill.

Philippines.

A. CARINATUS, A. Ad. Pl. 30, figs. 93, 94.

Whorls rounded, the last gibbous towards the suture, flattened on the base, which is surrounded by a keel, becoming stronger towards the aperture, umbilicus rather large, defined by an angle, aperture obliquely subquadrate. Diam. 4 mill.

Seto-Uchi, Japan.

A. PLANORBULUS, A. Ad. Pl. 30, figs. 95, 96.

Shell much depressed, planorbiform, spire not raised, whorls rounded, the last rapidly increasing towards the aperture, umbilicus very large, not defined, aperture round. Diam. 4·5 mill.

Philippines.

A. SUBCARINATUS, Montagu. Pl. 30, fig. 97.

Depressed turbinate, white, subcostulate-striate, encircled by two or three equidistant spiral threads above, sometimes obsolete, occasionally developed into ridges, base convexly flattened, bicarinated, umbilicus moderate. Diam. 3 mill.

Europe.

It is *A. carinatus*, Wood, and *Delphinula pusilla*, Phil.

A. ANGASI, A. Ad. Pl. 30, figs. 98, 99.

Much depressed, discoidal, thin, white, convexly flattened above, whorls few, rapidly increasing, periphery sharply carinated and crenulated by radiating strong growth striæ, which also crenulate

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the suture, concavely flattened below, with the folds of the growth striæ very prominent, umbilicus wide, aperture large, basal.

Diam. 4·5 mill.

Australia; Singapore (Archer).

A. VINCENTIANUS, Angas. Pl. 30, fig. 100.

Widely umbilicated, rather thin, semipellucid, white; whorls 3, rapidly increasing, the last very large, convex, finely undulately concentrically striated, obtusely keeled below the periphery, and with a basal keel surrounding the umbilical region, which is slightly crenated by rude growth-lines; aperture semilunar, the inner lip nearly straight, sinuously angulated above. Diam. 6 mill.

Aldinga Bay, St. Vincent's Gulf, Australia.

A. SCABER, Phil. Pl. 30, figs. 99 *a*, *b*.

White, scabrous, with elevated, subserrated spiral lines above, and sublamellar incremental lines below, whorls rapidly increasing, the last with acutely angulated periphery. Diam. 3 mill.

Panama.

A. TENUILIRATUS, Smith. Pl. 30, figs. 1–3.

Moderately umbilicated, yellowish, marked with spiral interrupted lines and oblique radiating streaks of dark olivaceous, base yellowish white, unicolored; whorls 4, convex, rapidly increasing, with deep suture, obliquely striate, and with thin spiral liræ; aperture subcircular, receding at the base, whitish, showing the external markings. Diam. 3 mill.

San Christoval, Solomon Is.

I think this will prove to be a Trochus; there are slight evidences of pearly nacre on the specimens before me.

Unfigured and doubtful species.

A. COSTATUS, Garrett. =*Fossarus Garretti*, Pease, Manual, ix, 272.

A. VARIUS, Hutton. =*Fossarina*, Manual, ix, 276.

A. ABJECTA, C. B. Ad. =*Fossarus*, Manual, ix, 274.

A. STRIATUS, Chemn. =*Circulus striatus*, Phil.

A. IMPERSPICUUS, Monts. *Sicily.*

A. ORBIGNYI, Fischer. *Cuba.*

A. FIMBRIATUS, Martens. *New Guinea.*

A. PICTUS, Tenison-Woods. *Tasmania.*

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Genus ARCHYTÆA, Costa, 1869.

I have added to this genus a number of species described as Adeorbis, but which are related to the following type species by the characters of the shell.

A. DELICATUM, Phil. Pl. 30, fig. 6.

Moderately umbilicated, thin, semipellucid, white; whorls 3½, convex, the last large, suture well impressed, base a little flattened; surface smooth, microscopically decussated; aperture oval, peristome simple, nearly continuous. Diam. 1·1 mill.

Norway; fossil in Sicily.

Var. EXPANSA, Sars. Pl. 30, fig. 7.

Shell and aperture more oblique, dilated below. Diam. 1·4 mill.

Norway.

A. SUTURALE, A. Ad. Pl. 30, figs. 4, 5.

Rather narrowly umbilicated, very finely concentrically striated, thin, semipellucid, white, spire a little elevated; whorls somewhat convex, rapidly increasing, suture deep; aperture rounded. Diam. 1·5 mill.

Tsu-Sima, Japan.

A. CORNICULUM, A. Ad. Pl. 30, figs. 8, 9.

Umbilicus narrow, defined by an angle, white, translucent, very minutely striated; whorls somewhat convex, rapidly increasing, the last rounded, large; aperture round. Diam. 2 mill.

Mino-Sima, Japan.

A. DIAPHANUM, A. Ad. Pl. 30, figs. 10, 11.

Narrowly umbilicated, globose, transparent; whorls rounded, the last inflated; aperture round. Diam. 1·5 mill.

Gotto Is., Japan.

A. EXQUISITUM, Jeffreys. Pl. 30, figs. 12, 13.

Rather widely, deeply umbilicated, white, rather thin, transparent and glossy, microscopically decussated, the crossings slightly nodose; whorls 3, convex, with deep suture; aperture obtusely subtriangular. Diam. 1·75, alt. 2·5 mill.

Mediterranean Sea.

Subgenus PSEUDORBIS, Monts., 1884.

A. GRANULUM, Brugnone. Pl. 30, fig. 14.

White, subglobose, spire a little exserted, whorls 3, spirally ribbed, ribs elevated, scarcely umbilicated, peristome subcontinuous. Diam. 1.5 mill.

Mediterranean Sea.

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Family *CYCLOSTREMATIDÆ.*

Genus CYCLOSTREMA, Marryatt, 1818.

Section Cyclostrema, (*sensu stricto*).

C. anaglypta, A. Ad. Pl. 31, figs. 15, 16.

Turbinate, with broad, flattened umbilicus, last whorl with three spiral, beaded ribs, convex, white, solid, lip externally crenulated. Diam. 4 mill.

Seto-Uchi, Japan.

C. micans, A. Ad. Pl. 31, figs. 17, 18, 19, 20.

More depressed than the preceding species, thick, white, last whorl with three spiral nodulous ribs, the middle one more prominent, peristome continuous, thick, externally crenulated, umbilicus rather small.

Japan, Singapore, Australia.

C. pulchella, Dunker, (figs. 19, 20) is a synonym.

C. Calameli, Jousseaume. Pl. 31, figs. 21, 22.

Rather widely umbilicated, white, thick, solid, minutely costulate, with an obscure spiral line above, periphery angulated, base with three carinæ crossing the radiating striæ, producing a subnodulous surface. Diam. 2·5 mill.

Prince's Isl. W. Africa.

C. Marchei, Jousseaume. Pl. 31, figs. 23, 24, 25.

Rather widely umbilicated, white, thick, solid, with spiral riblets, that in the middle of the upper surface tuberculated, riblets closer on the base. Diam. 2·5–4·5 mill.

Poulo-Penang, Singapore, Viti Is.

The larger diameter and last locality are for *Vitrinella sculptilis*, Garrett (fig. 25), an undoubted synonym, the types agreeing completely with Singapore specimens collected by Archer.

C. Reeveana, Hinds. Pl. 31, fig. 26.

Moderately umbilicated, white, radiately lirate, crossed above by several spiral ridges, of which the centre one is more prominent, forming an angle, ridges close below, spinously tuberculated by the radiating liræ, umbilical wall radiately closely striate.

Diam. 10 mill. *Singapore.*

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C. CANCELLATA, Marryatt. Pl. 31, figs. 27, 28.

White, sublenticular, flattened convex above, more convex below, with oblique radiating riblets, interrupted by an obtuse peripheral rib, the interstices of the riblets finely spirally striated, umbilicus moderate. Diam. 6 mill.

West Indies; Philippines?

C. EBURNEA, Nevill. Pl. 31, figs. 29, 30.

Narrowly umbilicated, thick, white, shining, longitudinally obliquely plicate, the interstices spirally striated, suture narrowly margined, periphery with a corded carina, bordered by an impressed line above and below, base sculptured like the upper surface.

Diam. 4·75 mill.

Pooree, Bay of Bengal.

The Philippine specimens referred to *C. cancellata*, Marryatt by Sowerby, may prove to belong to this species.

C. ALVEOLATA, Jousseaume. Pl. 31, figs. 31, 32.

Depressed, widely umbilicated, rather thick, transparent, vitreous white, with an occasional spiral ridge, between which are radiating riblets, both above and below, the interstices spirally striate.

Diam. 1·5 mill.

Hab. unknown.

C. SCHRAMMII, Fischer. Pl. 31, fig. 33.

Subdepressed, spire rather flattened, whorls excavated below the suture, with strong, oblique, sharp radiating ribs.

Diam. 3·5 mill. *Isl. Guadeloupe, West Indies.*

C. ARCHERI, Tryon. Pl. 33, fig. 84, 85.

Rather widely umbilicated, shell depressed, spire scarcely elevated, whorls rounded, with regular convex longitudinal ribs, the interstices finely spirally lirate, peristome thickened. Diam. 2·5 mill.

Singapore (Archer).

C. AMMONOCERAS, A. Ad. Pl. 31, figs. 34, 35.

Depressed, spire slightly elevated, last whorl flattened near the suture and around the moderate umbilicus, with rather thick, distant longitudinal ribs, the interstices finely spirally striated, aperture large, outer lip thin. Diam. 3 mill.

Japan.

Less depressed, with more distant and prominent ribs than the preceding species; differs also in the thin peristome, and sutural and basal flattening of the body whorl.

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C. EXCAVATA, Carpenter. Pl. 31, figs. 36, 37.

Flatly convex above, flattened below, the wide umbilicus defined by an angle, minutely spirally striated, last whorl angulated at the base, peristome thin. Diam. 6 mill.

China Sea.

C. ATOMUS, Issel. Pl. 31, figs. 38, 39.

Narrowly umbilicated, somewhat solid, greenish, a little shining, obliquely longitudinally striate; whorls 4½, rapidly enlarging, slightly convex, the last subangulated at the base, umbilical area longitudinally crispate; peristome thickened, continuous.

Diam. 1·5 mill. *Suez.*

C. NEVILLI, H. Adams. Pl. 31, fig. 40.

Narrowly umbilicated, disk-like, subpellucid, shining, thin, spirally lirate and radiately striate, smooth at the periphery, spire subplane, suture scarcely impressed; whorls 4, moderately increasing, flattened, the periphery angulated, base more convex; peristome simple, umbilicus with callous margin. Diam. 4·5 mill.

Ceylon.

C. MILITARIS, Jousseaume. Pl. 31, figs. 41, 42.

Widely umbilicated, depressed, thin, pellucid, slightly convex and faintly, finely, irregularly striate above, base nearly plane, equally striate, the striæ becoming stronger upon the walls of the umbilicus, with a spiral thread-like carina near the periphery of the base, and another close to the umbilicus. Diam. 2·75 mill.

Prince's Isl., W. Africa.

C. AREOLATA, Sars. Pl. 31, figs. 43–45.

Widely, perspectively umbilicated, solid, semipellucid, white, finely spirally lirate, crossed by close incremental striæ; whorls 3, convex, moderately increasing; aperture orbicular, peristome thin.

Diam. 1·4 mill. *Arctic Norway.*

C. VERRILLI, Tryon. Pl. 31, fig. 46.

Widely umbilicated, depressed, with low spire, white, finely, longitudinally, obliquely striate, with several spiral lines on the body whorl above the periphery, more numerous and closer on the base; whorls 3½, the last large, very convex, base oblique; aperture large, very obliquely ovate, periphery thin and sharp.

Diam. 2·2 mill. *Off New England;* 545 fms.

Described by Verrill as *C. cingulatum*, a specific name twice preoccupied.

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C. DIAPHANA, Verrill. Pl. 31, fig. 47.

Narrowly umbilicated, depressed trochiform, thin, translucent, white, smooth, shining; whorls 3½, very convex, with deep suture, smooth, except twenty to twenty-five close spiral lines around the umbilical perforation. Diam. 3 mill.

Off New England; 98 fms.

C. DUNKERI, Tryon. Pl. 32, figs. 48, 49.

Widely umbilicated, depressed, with a spiral rib near the suture, another on the periphery, and a third circumscribing the umbilicus. Diam. 2·5 mill. *Japan.*

Described by Dunker as *C. cingulata*, a name preoccupied by Philippi.

C. PHILIPPII, Issel. Pl. 32, figs. 50, 51.

Widely umbilicated, yellowish white, obsoletely radiately plicate-striate, with three spiral ridges, one near the suture, the other defining a narrow peripheral area; whorls 3½, rapidly increasing, flattened above, a little convex below, umbilicus defined by a granular rib. Diam. 1·5 mill.

Suez.

C. CINGULATA, Philippi. Pl. 32, figs. 53, 54.

Narrowly umbilicated, with radiating low, broadly rounded undulations above, scolloping the periphery, quadricarinate in the adults, bicarinate in the young, the carinæ being more acuate, sinuately dentate, and dotted with brown; aperture subcircular in the adult. *Red Sea.*

The only figure represents a young shell, 1·5 mill. in diam. The size of the adult is not given.

C. VERREAUXII, Fischer. Pl. 32, fig. 52.

Moderately umbilicated, whorls rapidly increasing, the last encircled by three keels, of which the peripheral one is most prominent, and produced at the aperture into a tongue-shaped lobe, umbilical wall flattened, defined by an angle, peristome produced by the peripheral keel. Diam. 4·5 mill.

California.

I believe that the indefinite locality given by Fischer thirty years ago remains unverified.

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C. BIPORCATA, A. Ad. Pl. 32, figs. 56, 57.

Rather narrowly umbilicated, orbicularly depressed, last whorl with two sharp keels of which the lower is most prominent, aperture rather rounded, outer lip two-lobed. Diam. 2·5 mill.

Seto-Uchi, Japan.

C. LÆVIS, Kiener. Pl. 32, fig. 55, 59, 60.

Widely umbilicated, depressed, smooth, last whorl encircled by a number of rather distant keels, one of which forms an angular periphery, umbilicus with a flat wall, defined by a rib.

Diam. 15 mill.

Port Lincoln, Australia; Japan; Viti Is.

It is *C. diatreta*, Gould, and *Delphinula nivea*, Reeve. The latter attributes his species to Chemnitz, who in this, as in many other instances was not binomial. *C. lactea*, Jouss, (figs. 79, 60), a species described as differing from *lævis* in the regularity of its keels, also appears to belong here, for the keels are very irregularly developed in number, prominence and spacing; it was described from a single specimen, without locality.

C. DUPLICATA, Lischke. Pl. 32, fig. 58.

Moderately umbilicated, rather solid, striate, carinate at the suture, bicarinate at the periphery, with two less developed carinæ on the base, circumscribing the flat-walled umbilicus; periphery thickened.

Diam. 4 mill. *Japan.*

C. VIRGINIÆ, Jousseaume. Pl. 32, figs. 61, 62.

Widely umbilicated, thick, solid, opaque, white, with about eleven rounded spiral ribs on the last whorl, the intervening grooves longitudinally striate, the striæ more prominent around the umbilicus, whorls 4½, rapidly enlarging, convex; peristome thickened.

Diam. 6 mill. *Madagascar?*

Has more ribs than *C. cingulifera*, A. Ad.

C. ANGULATA, A. Adams, Pl. 32, figs. 63, 64, 65.

Widely umbilicated, periphery keeled, with spiral liræ above it, base with a submedian keel, defining the umbilicus, and producing the basal margin of the peristome. Diam. 12 mill.

Isl. Zebu, Philippines; Guadeloupe, St. Martin, W. Indies.

C. angulata, A. Ad. was described as from the Philippines on the authority of Cuming, but as that great collector sometimes made

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mistakes, the locality needs confirmation. There can be no doubt of the identity with this species of *C. Beaui*, Fischer (fig. 63), a West Indian species.

C. TRICARINATA, Smith. Pl. 32, figs. 66–68.

Widely umbilicated, depressed, white; whorls 5, rapidly increasing, spirally lirate, the last whorl acutely tricarinated, the peripheral carina strongest; aperture subhexagonal, peristome acute.

Diam. 3 mill. *Whydah, West Africa.*

C. ROSEOTINCTA, Smith. Pl. 32, fig. 70.

Moderately umbilicated, rosy white; whorls 4, convex, distantly, slightly, spirally lirate, decussated by faint incremental striæ, suture depressed; peristome thin. Diam. 1·75 mill.

Whydah, W. Africa.

C. CARINATA, H. Adams. Pl. 32, fig. 71.

Widely umbilicated, solid, with regular, angular spiral carinæ, the interstices radiately sculptured; whorls 4, convex, rapidly increasing, the last dilated in front; aperture subcircular, peristome thickened, subcontinuous. Diam. 2·5 mill.

Persian Gulf.

C. CINGULIFERA, A. Ad. Pl. 32, figs. 72, 73.

Widely, flatly umbilicated, depressed, whorls rapidly increasing, the last encircled by six prominent, very sharp ribs; peristome externally fluted. Diam. 3·5 mill.

Philippines, Japan.

C. TATEI, Angas. Pl. 32, figs. 74, 74*a*.

Widely, deeply umbilicated, moderately thin, shining, pearly white, microscopically striated; whorls 4, rounded, flattened and slightly excavated next below the suture, with one, or sometimes two, narrow thread-like keels at the upper part, and strongly keeled round the umbilical region, suture distinct; aperture subcircular, lip simple. Diam. 2·5 mill.

South Australia.

"The above is the normal condition of the species; but examples occur which are thinner and have a greater number of keels, sometimes as many as seven or eight. At first I was inclined to regard the many-keeled variety as specifically distinct; but on the examination of a large series by Professor Tate, he assures me that the number of keels varies so greatly that it would be impossible to separate them. The thin hyaline examples with many keels are probably younger shells."

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I have figured both the illustrations given by Mr. Angas. If his above remarks be well-founded, which I am very willing to believe, several species herein described, and which are principally distinguished by the number of revolving riblets will need to be suppressed; that of the inconoclast himself will be deservedly lost in the general ruin which he has caused.

C. TORNATA, A. Ad. Pl. 32, figs. 75, 76.

Rather narrowly umbilicated, depressed-subglobose, spire slightly elevated; whorls slowly increasing, rounded, spirally six-ribbed; aperture rounded. Diam. 4·5 mill.

Japan.

C. SULCATA, A. Adams. Pl. 32, figs. 77, 78.

Umbilicus very wide, grooved, spire convexly depressed, whorls regularly spirally sulcated, the last broad, aperture nearly rounded. Diam. 4 mill. *Philippines, Japan.*

C. EXIGUA, Phil. Pl. 32, figs. 79, 80.

Rather widely umbilicated, subdiscoidal, with radiating riblets fimbriating four spiral carinæ. Diam. 2·3 mill.

Aden, Arabia.

C. WATSONI, Tryon. Pl. 32, figs. 81, 82.

Widely umbilicated, rather depressed, with a narrow, concave shoulder on the whorls, periphery rounded, umbilicus broadly funnel-shaped, bordered by a thread-like carina, with another within it; white, under a slightly mottled or longitudinally banded smoky brown membranous, epidermis; whorls 4, rapidly increasing. Diam. 28 mill. *Off Pernambuco, Brazil;* 675 fms.

This is *C. sulcata,* Watson; preoccupied by A. Adams.

C. CONICA, Watson. Pl. 33, figs. 83.

Narrowly umbilicated, conical, with about 17 longitudinal lamellæ, the interstices spirally striate, white, suture well-impressed; whorls 4½, well-rounded, rapidly increasing, the last tumid; peristome continuous, but not solute. Diam. 1·5 mill.

Off Pernambuco; 350 fms.

Looks more like a *Scalaria* than a *Cyclostrema.*

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Unfigured species, described as Cyclostrema.

C. FLUCTUATA, Hutton. = *Turbinidæ.*
C. IMMACULATA, and C. SPINOSA, Tenison-Woods. *Tasmania.*
C. MODESTA, Gould. *Hong Kong.*
This has been referred to *C. micans*, A. Ad. but the description does not agree.

C. PENTEGONIOSTOMA, Carpenter. *Red Sea.*
C. CARBONNIERI, Jousseaume. *Aden.*
C. HARRIETTÆ, and C. MICRA, Petterd. *Tasmania.*
C. JOHNSTONI and C. BRUNNIENSIS, Beddome, *Tasmania.*
C. CONSPICUA, and C. DEPRESSA, Monts. *Mediterranean.*

Section TUBIOLA, A. Ad. 1864.

C. CORNUELLA, A. Ad. Pl. 33, fig. 14, 15.

Widely umbilicated, depressed turbinate, smooth, spire somewhat elevated, whorls rounded, rapidly increasing, the last large, aperture rounded. Diam. 2 mill. *Japan.*
Is possibly a *Skenea.*

C. JOSEPHI, Tenison-Woods. Pl. 33, fig. 9.

Widely umbilicated, obliquely turbinate, thick, white, opaque, maculated with very pale chestnut; whorls 5, rounded, closely spirally striate; peristome thick, posteriorly produced.
Diam. 3 mill. *Tasmania.*

C. SUSONIS, Tenison-Woods. Pl. 33, fig. 10.

Widely umbilicated, depressed, translucent white, polished, spire slightly exserted, whorls 4, rounded, aperture simple, orbicular.
Diam. 1·5 mill. *N. coast of Tasmania.*

C. WELDII, Tenison-Woods. Pl. 33, fig. 11.

Moderately umbilicated, umbilicus margined, depressed turbinate, somewhat translucent, thin, shining, smooth, with faint growth striæ, whitish; whorls 6, depressed convex; aperture rounded, everted posteriorly. Diam. 2 mill.
Long Bay, Tasmania.

C. MICRA, Tenison-Woods. Pl. 33, fig. 13.

Perspectively umbilicated, turbinate, minute, polished, white; whorls 5, rounded, with deep suture; peristome simple, acute.
Diam. 1·5 mill. *Long Bay, Tasmania.*

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C. DIVISA, Adams. Pl. 33, figs. 87, 88.

Widely umbilicated, turbinate, spire elevated, with obtuse apex, white; whorls 3, rounded, last whorl obliquely descending, becoming free; aperture obliquely ovate. Diam. 4 mill. *Europe.*

C. serpuloides, Mtg. is a synonym,

C. NIVEA, A. Ad. Pl. 33, figs. 89, 90.

Widely umbilicated, obliquely semiglobose, convex above, somewhat flattened below, spire slightly elevated, whorls rapidly increasing, aperture large, obliquely ovate. Diam. 5 mill.

Japan.

Adams very curiously publishes this as Chemnitz's *nivea*, and says that it is exactly similar to the figures in the "Conchylien Cabinet." The latter, is however, not being binomial, a synonym of *C. lævis*, Kiener, and neither agrees with the description nor the figures published by Adams (which I copy).

C. RUGULOSA, Jeffreys. Pl. 33, figs. 91, 92.

Narrowly umbilicated, pellucid, yellowish white, with short, obtuse spire, smooth, microscopically rugulose and spirally striate; whorls 3, convex, the last large, suture well-impressed.

Diam. 1·3 mill.

Norway, Mediterranean, New England (Verrill).

C. BASISTRIATA, Brugnone. Pl. 33, figs. 93, 94.

Narrowly umbilicated, shining, smooth; whorls 4½, tumid, with deep suture, rapidly increasing, base with oblique, arcuate striæ running into the umbilicus. Diam. 2·25 mill.

Spitzbergen to Dröbak; 50–1333 *fms. Fossil, Italian plioiene.*

The striæ sometimes extend over the whole shell, this state being *C. profundum*, Friele; *C. striolatum* Sars ms., is another synonym.

C. MINUTUM, Jeffreys. Pl. 33, fig. 95.

Perforate, thin, transparent, polished, white; whorls 3, convex, rapidly increasing; peristome continuous, partly appressed.

Diam. 62 mill. *Mediterranean Sea.*

C. CUTLERIANA, Clark. Pl. 33, fig. 96.

Narrowly umbilicated, depressed globose, spirally striate, white, whorls convex, rapidly increasing, suture deeply excavated.

Diam. 2 mill. *Europe.*

Helicella mutabilis, Costa, is a synonym.

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C. NITENS, Phil. Pl. 33, fig. 97.

Narrowly umbilicated, more depressed and thicker, more glossy than the preceding species; there are a few indistinct grooves on the upper part of the umbilicus, otherwise the surface is smooth and polished. Diam. 87 mill. *Europe.*

Margarita pusilla, Jeffreys is a synonym.

Var. ALDERI, Jeffreys.

Shell thinner and more transparent. *Skenea lævis*, Forbes and Hanley is possibly identical.

C. TROCHOIDES, Jeffreys. Pl. 33, figs. 98, 99.

Perforate, somewhat solid, white, opaque, smooth, shining, base sometimes with a few faint oblique, curved lines; whorls 4, convex, with deep suture; columellar lip vertical, forming a slight angle with the outer lip at their junction. Diam. 2 mill.

Norway.

It is *C. Peterseni*, Friele.

C. DALLI, Verrill. Pl. 33, fig. 100.

Umbilicus imperforate or narrowly rimate, yellowish white, smooth except for minute grooth-lines; whorls 3½, rapidly enlarging, well rounded, with deep suture, base with seven or eight spiral incised lines. Diam. 2·25 mill.

Off N. England Coast.

It is *C. trochoides*, Verrill, not Jeffreys.

Var. ORNATUM, Verrill. Pl. 33, fig. 1.

Spiral lines of the base crossed by thin, impressed, oblique lines.

C. BITHYNOIDES, Jeffreys. Pl. 33, fig. 23.

Narrowly umbilicated, thin, the fine growth lines crossed by microscopic close-set spiral striæ, giving the surface a frosted appearance, whitish; whorls 3½, rapidly increasing, the last tumid; peristome continuous, but partly adnate. Diam. 1·25, alt. 1·66 mill.

European Atlantic (Porcupine Exped.), *Mediterranean.*

C. AFFINIS, Jeffreys. Pl. 33, fig. 5.

Narrowly umbilicated, rather thin, semitransparent glossy, without sculpture, white, suture narrow but deep; whorls 4, swollen, rapidly increasing; periphery simple, acute. Diam. 1·87 mill.

Bay of Biscay, Palermo; 103–913 *fms.*

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C. PROXIMA, Tryon. Pl. 33, fig. 4.

Narrowly umbilicated, faintly striate, with a few indistinct spiral lines below the suture, and numerous well defined ones on the base, around the umbilicus the inferior striæ stronger, surface smooth, greyish white, suture impressed, whorls very convex, rapidly increasing; periphery round, thin, slightly in contact.

Diam. 2·2 mill. *Off New England Coast;* 843 *fms.*

Said to be closely allied to *C. basistriata*, Brugnone. Described by Prof. Verrill as *C. affinis*, preoccupied by Jeffreys for the preceding species.

C. TENERA, Jeffreys. Pl. 33, fig. 6.

Narrowly umbilicated, thin, semitransparent, lustreless, with nearly microscopic spiral striæ, which are wanting on the base and replaced by a rugose or fretted appearance, pale yellowish white, with a faint greenish tinge, suture very deep; whorls 4, convex; mouth circular, peristome thin, slightly expanded. Diam. 2·5 mill.

European Atlantic (Porcupine Exped.)

C. SIMILIS, Jeffreys. Pl. 33, fig. 7.

Moderately umbilicated, depressed turbinate, rather thin, glossy, opaque, without sculpture; whorls 4½, convex, rapidly increasing, suture wide and deep; mouth nearly circular, slightly appressed, peristome thin. Diam. 1·25 mill.

European Atlantic (Porcupine Exped.)

C. VALVATOIDES, Jeffreys. Pl. 33, fig. 8.

Narrowly umbilicated, rather solid, opaque, glossy, with a few irregular growth-lines, yellowish white, spire with rather flattened apex, suture deep; whorls 4, well-rounded; peristome considerably expanded. Diam. 3·12 mill.

European Atlantic (Porcupine Exped.)

C. SPHÆROIDES, S. Wood. Pl. 32, fig. 69.

Narrowly umbilicated, white, spirally costate; whorls three, rapidly increasing, suture deep. Diam. 1·25 mill.

Bay of Biscay.

Described as a fossil of the Crag, Sutton, England, and said to be nacreous in the original diagnosis.

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C. TUBERCULOSA, d'Orb. Pl. 35, fig. 65*a*.

Narrowly umbilicated, thick, white, with six tuberculated spiral ribs; whorls 4, convex, the last large; aperture rounded, peristome thick, externally tuberculated. Diam. 2 mill.

Cuba.

Section DARONIA, A. Adams. 1864.

C. CYCLOTINA, A. Ad. Pl. 33, fig. 16.

Umbilicus large, flat within, surface smooth, spire flat, last whorl rapidly increasing, not contiguous, aperture subangular above. Diam. 4 mill. *Japan.*

C. SUBEXCAVATA, Tryon. Pl. 33, figs. 17, 18.

Umbilicus wide, perspective, shallow, whitish under a yellowish brown, membranous epidermis, spire scarcely raised, suture broadly, angularly impressed, a little below the suture there is a bluntly angulated spiral keel, and on the middle of the base, towards the mouth there is another keel; whorls 4, rather slowly increasing, until the last, which is rather large; mouth a little oblique, peristome simple, thin. Diam. 2·15 mill.

Off Culebra Isl., W. Indies; 390 *fms.*

Described by Watson as *C. excavata*, preoccupied by Carpenter.

C. CATENOIDES, Monts. Pl. 34, figs. 20, 21.

Widely umbilicated, closely spirally striated throughout, with several spiral chain-like lines on the base, whorls convex, regularly increasing. Diam. 1·25 mill.

Harbor of Civita Vecchia, Italy.

C. SEMISULCATA, Issel. Pl. 34, fig. 22.

Widely umbilicated, subpellucid, shining, closely spirally sulcate above, smooth below; whorls 4, rapidly increasing, convex; peristome simple, acute, margin interrupted. Diam. 3 mill.

Red Sea.

C. OCTOLYRATA, Carpenter. Pl. 34, figs. 24, 23.

Widely umbilicated, with eight spiral liræ covering the last whorl; whorls 3½, convex, regularly increasing; peristome thin, modified by the liræ. Diam. 1·75 mill. *Red Sea.*

The figure is from a shell identified by Issel with Carpenter's description.

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V. DECUSSATA, Cpr. Pl. 34, fig. 37.

Moderately umbilicated, turbiniform, thin, porcellanous, white; whorls 4½, rounded, the last with about 15 spiral ridges, decussated by more or less distant radiating striæ; peristome continuous in the adult. Diam. 1 mill. *Mazatlan.*

V. MONILE, Carp. Pl. 34. fig. 38.

Narrowly umbilicated, subelevated, heliciform, diaphanous, white; whorls 4½, very minutely decussately striate on the last whorl, the spiral lines being about twenty in number; peristome continuous, sinuous as in Ianthina. Diam. 1·3 mill. *Mazatlan.*

The decussating sculpture enters the umbilicus; the interstitial spaces are suboval, punctate, appearing (in a favorable light) like rows of pearl necklaces.

V. SUBQUADRATA, Carp. Pl. 34, fig. 39.

Widely umbilicated, subhyaline white, smooth, shining, discoidal planate, whorls 4, sometimes striate at the suture, the last whorl subangulated near the umbilicus and below the periphery; aperture subquadrate, lip sinuated at the suture and in the middle.

Diam. 1 mill. *Mazatlan.*

V. HELICOIDEA, C. B. Ad. Pl. 34, figs. 40, 41.

Widely umbilicated, discoidal, white, opaque or translucent, with an impressed sutural line, and transverse unequal striæ, spire convex, scarcely elevated; whorls 4, subconvex, the suture scarcely impressed; peristome subthickened; umbilicus defined by a spiral angle.

Diam. 1·87 mill. *Jamaica.*

V. STRIATA, d'Orb. Pl. 34, figs. 42, 43.

Narrowly umbilicated, translucent, whitish, spirally striate; aperture oblique, peristome slightly thickened, slightly sinuous; periphery subangulated. Diam. 1 mill. *Cuba.*

V. ANOMALA, d'Orb. Pl. 34, figs. 44, 45.

Umbilicated, subdiscoidal, translucent, smooth, whitish; whorls 5, flatly convex, periphery subangulated; peristome slightly thickened.

Diam. 2 mill. *Cuba.*

Unfigured Species.

Neither Adams nor Carpenter figured any of the numerous species described by them. I have been able to illustrate a few of the species of both authors, by drawings from authentic specimens; many

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of the others might be identified in the type collections of these authors, but the labor and expense attending such an investigation would scarcely be repaid by the result. The paucity of material and minuteness of the species must prevent satisfactory conclusions, most of the descriptions being based upon dead specimens, unique or few in number.

V. PANAMENSIS, V. CONCINNA, V. JANUS, V. MODESTA, V. SEMINUDA, V. TRICARINATA, C. B. Adams. *Panama.*

V. EXIGUA, C. B. Ad. (V. TRIGONATA, Cpr. a synonym). *Panama–Mazatlan.*

V. HYALINA, V. INTERRUPTA, V. TINCTA, C. B. Ad. *Jamaica.*

V. MEGASTOMA, C. B. Ad. (?= Ethalia). *Jamaica.*

V. REGULARIS, V. VALVATOIDES, V. MINUTA, C. B. Ad. (?=Ethalia). *Panama.*

V. MONILIFERA, V. LIRULATA, V. BIFILATA, V. BIFRONTIA, V. CORONATA, V. ANNULATA, V. CINCTA, V. CARINULATA, V. NATICOIDES, V. PLANOSPERATA, V. ORBIS, V. TENUISCULPTA, V. SPIRULOIDES, V. ORNATA, Carpenter. *Mazatlan.*

V. PERPARVA, C. B. Ad. and var. NODOSA, Carp. *Panama–Mazatlan.*

Genus TEINOSTOMA, H. and A. Adams, 1853.

T. POLITUM, A. Ad. Pl. 34, figs. 46, 47.

Much depressed, flattened above, polished, white, periphery subangulated, peristome thickened above and below. Diam. 7·5 mill. *Philippines.*

T. CARPENTERI, A. Ad. Pl. 35, figs. 52, 53.

Much depressed; spire nearly covered by a callous deposit, only exposing the apex, last whorl flattened, periphery faintly angulated, umbilical callus rounded. Diam. 2·75 mill. *Gulf of Pechili.*

T. CONCENTRICUM, A. Ad. Pl. 35, figs. 54, 55.

Depressed convex, finely spirally striate, white, body whorl rounded at the periphery, aperture transversely ovate.
Diam. 2·75 mill. *Takano-Sima, Japan.*

T. RADIATUM, A. Ad. Pl. 35, figs. 56, 57.

Depressed orbicular, convex above, somewhat flattened on the base, periphery rounded, ridged by strong growth-lines, peristome callously projecting above, basal callus somewhat excavated.
Diam. 3 mill. *Kino-O-Sima, Japan.*

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T. PUNCTATUM, Jousseaume. Pl. 34, figs. 48, 49.

Depressed convex, solid, subtranslucent, yellowish white, more flattened below, umbilicus almost covered, surface covered by microscopic, close granular spiral striæ, more apparent at the suture and around the umbilicus. Diam. 2·5 mill.

Prince's Isl. W. Africa.

T. MORLIERI, Jousseaume. Pl. 34, figs. 50, 51.

Subopaque, milk-white, slightly convex above, nearly flat below, umbilicus almost completely covered, suture narrow-margined, surface microscopically spirally striate. Diam. 3·5 mill.

Martinique.

In this species the heavy umbilical callus joins at a somewhat acute angle with the columellar lip, of which it is an extension, the angle forming a pit.

T. LUCIDUM, A. Adams. Pl. 35, figs. 58, 59.

Depressed orbicular, smooth, white, spire enveloped with callus, umbilicus covered by a heavy, convex callous deposit, aperture a little oblique. Diam. 1·5 mill. *Japan.*

T. AMPLECTANS, Carpenter. Pl. 35, figs. 60, 61.

Depressed-convex, white, whorls very rapidly increasing, spire small, last whorl large, oblique, periphery subangulated, aperture subtriangular, umbilical region covered by a large callus.

Diam. 2·5 mill. *Mazatlan.*

T. SUBSTRIATUM, Carp. Pl. 35, figs. 62, 63.

Shining, smooth, white, very minutely impressly striated near the suture, callus strong,convex, narrow, coiling round the umbilical fissure, lip thick. Diam. 2 mill. *Mazatlan.*

T. DIAPHANUM, d'Orb. Pl. 35, figs. 64, 65.

Depressed orbicular, thin, diaphanous, vitreous, smooth, shining, white, umbilicus slightly callous, whorls convex, rather slowly increasing. Diam. 1·5 mill.

St. Thomas, W. I.

T. CARINATUM, d'Orb. Pl. 35, figs. 66, 67.

Depressed convex, lenticular, periphery strongly carinated, the carina forming a sutural margin above, smooth, thin, diaphanous white, umbilicus minutely callous. Diam. 1·5 mill.

St. Thomas, W. I.

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T. SOLIDUM, E. A. Smith. Pl. 35, fig. 68.

Shell solid, small, light fulvous, smooth; whorls 4, rapidly increasing, the last smooth above, base flattened, with three exterior spiral sulci, umbilical region callous; peristome receding at the base.

Diam. 3·3 mill. *Whydah, W. Africa.*

Unfigured Species.

T. CARBONNIERI, T. DESCHAMPSI, T. RHINOCERAS, Jousseaume.
Aden.

Section CALCEOLINA, A. Ad. 1863.

T. PUSILLUM, C. B. Ad. Pl. 35, figs. 69, 70.

Orbicular-depressed, very minutely striated, suture impressed, last whorl large, aperture widely lunate, columellar lip septiform, with straight margin, whence a wide callus spreads over the umbilicus. Diam. 1·5 mill.

Jamaica, Japan (A. Adams).

This species, figured from Japanese specimens, is said by A. Adams to be identical with the above named Jamaica species; I have no means of verifying this. *T. anomalum*, H. and A. Adams is a synonym.

Subgenus PSEUDOROTELLA, Fischer, 1857.

T. SEMISTRIATA, d'Orb. Pl. 35, figs. 71–73.

Orbicularly depressed, thin, diaphanous whitish, closely, minutely spirally striate above, smooth below, with a somewhat flat, shining, transparent umbilical callus; whorls 4, slightly convex, slowly increasing, peristome thickened. Diam. 1·5 mill.

Cuba.

Subgenus DISCOPSIS, Folin, 1869.

T. OMALOS, Folin. Pl. 35, fig. 74.

Shell much depressed, disk-like, thin, diaphanous, vitreous, shining, almost plane above; whorls 3, rapidly increasing, the last whorl spirally tri-lirate, widely cristate at the periphery, base slightly convex, umbilicated, aperture large, oblique, subtriangular, peristome acute, left margin a little reflected, separating into a thickened tongue-like projection at the base. Diam. 1·7 mill.

Pointe a Pitre, Guadeloupe, W. I.

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T. COSTULATUM, Folin. Pl. 35, fig. 75.

Deeply umbilicated, depressed, disk-like, very slightly convex above, subplanate below, vitreous, whitish, longitudinally minutely costulate, above the base these are decussated by a spiral thread; whorls 3, rapidly increasing, base with cord below the periphery; aperture oblique, subcordiform, margins subacute, joined by an oblique channel above the penultimate whorl. Diam. 2 mill.

Cape Sta. Anne, W. Africa.

Subgenus LEUCORHYNCHIA, Crosse, 1867.

T. CALEDONICUM, Crosse. Pl. 35, figs. 85, 86.

Subdiscoidal, slightly convex above and below, polished, shining, whitish; whorls 3, flattened, rapidly increasing, periphery carinate; peristome continuous, simple, thickened at the base and produced into a tongue-like callus past the umbilicus, leaving a perforation between it and the columellar wall. Diam. 3 mill.

New Caledonia.

T. CROSSEI, Tryon. Pl. 35, figs. 86*a*, 86*b*.

Differs from the above in having a rounded periphery; surface polished, without a trace of striæ. Diam. 3 mill.

Singapore, (Archer).

Subgenus MICROTHECA, A. Ad. 1863.

T. CRENELLIFERUM, A. Ad. Pl. 35, figs. 76, 77.

Thick, globose, broadly umbilicated, longitudinally, somewhat obliquely plicate, whorls crenulated at the channeled suture, umbulicus with a crenulated marginal angle, peristome thick.

Diam. 3·5 mill. *Japan.*

Subgenus MORCHIA, A. Adams, 1860.

T. OBVOLUTA, A. Ad. Pl. 35, figs. 78, 79.

Obliquely ovate, laterally compressed, last whorl angular above and below, the spire depressed, umbilicus wide, its margin subangulate, aperture obliquely ovate, peristome thick, continuous.

Diam. 3·5 mill.

Japan.

T. MORELETI, Fischer. Pl. 35, figs. 80–82.

Depressed, whitish, whorls 4, the first ones obliquely immersed, the last embracing, obliquely flattened with a tuberculate-crenate

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peripheral carina, prominent and crenate at the suture, base flattened, widely umbilicated, the umbilicus bordered by a crenate angle; aperture horizontal, subbasal, peristome thickened, duplicate, continuous, callously reflected. Diam. 2 mill.

China Sea.

A bizarre affair, which differs widely in appearance from the type of the group.

T. BIPLICATA, Fischer.

Like the preceding species, but smaller, more convex above, and concave below, last whorl radiately ribbed, carinated below, ribs paired, uniting in a pre-sutural tubercle. Diam. 1·75 mill.

China Sea.

Unfigured.

Subgenus CIRSONELLA, Angas, 1877.

T. AUSTRALE, Angas. Pl. 35, figs. 83, 84.

Globosely turbinate, narrowly umbilicated, semi-opaque, smooth, shining, white; whorls 4, convex; the last large, rounded at the periphery; aperture circular, peristome continuous, slightly thickened on the columellar margin. Diam. 2 mill.

Botany Bay, N. S. Wales, Australia.

Subgenus HAPLOCOCHLIAS, Carpenter, 1864.

T. CYCLOPHOREUS, Carp.

Compact, small, solid, whitish or light yellowish; whorls 5, rapidly enlarging, suture impressed; very minutely spirally striate, shining; aperture rounded, peristome continuous, thickened, varicose exteriorly, inner lips distinct; umbilicated in the juvenile, adult rimate. Diam. 5 mill.

Cape St. Lucas, Lower California.

Subgenus CYNISCA, H. and A. Adams, 1854.

T. GRANULATUM, A. Adams.

Orbicularly depressed, widely umbilicated, white, with granular spiral ribs, last whorl rounded, umbilicus patulous, perspective, callously margined, aperture rounded, columella sinuate, lip thickened within, subcrenulated.

Philippines.

No dimensions or figure.

T. JAPONICA, A. Ad. *Unfigured.* *Japan.*

This is said to = *Collonia pilula*, Dunker.

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Family *LIOTIIDÆ.*

Genus LIOTIA, Gray, 1842.

L. SCALAROIDES, Reeve. Pl. 36, fig. 87.

Subglobose, white, stained with chestnut, with seven distant oblique varices, crossed by a few raised spiral striæ, umbilicus moderate, with angular margin, interior of aperture salmon-colored. Diam. 15 mill.

Philippines.

L. DEPRESSA, Reeve. Pl. 36, fig. 88.

Flatly rounded, spire remarkably depressed, last whorl somewhat shouldered, distantly obliquely costate, with distant spiral ribs, the intersections subspinous or nodose, interstices punctate in spiral series. Diam. 21 mill. *Philippines.*

L. VARICOSA, Reeve. Pl. 36, fig. 89.

Angularly globose, with longitudinal thick varices, rendered nodulous by the crossing of spiral liræ, interstices punctate.

Diam. 18 mill.

Philippines.

L. CIDARIS, Reeve. Pl. 36, fig. 90.

Depressed globose, solid, rounded, with broad varices and rather wider interspaces, crossed by spiral ribs, of which two median ones are more prominent, lower part of the body whorl deeply punctate.

Diam. 21 mill. *Philippines.*

L. PERONII, Kiener. Pl. 36, figs. 91, 92.

Shell shouldered, radiately distinctly ribbed to the shoulder, below which they become obsolete, with a spiral rib forming the shoulder and another just below it, tooth somewhat tubercular, and numerous small elevated spiral liræ, becoming granular below, between the liræ are minute punctations, and a row of large, deep pits revolves around the base, outer lip strongly, crenulately varicose.

Diam. 12–20 mill.

China, Australia, Philippines, Mauritius, Viti Is.

L. Hermanni, Dunker is a synonym.

L. CRASSIBASIS, E. A. Smith. Pl. 36, fig. 94.

Solid, umbilicated, smooth; whorls 4, plane above, scarcely sloping, bicarinate, radiately ribbed, and spirally lirate, base produced and greatly thickened, forming a very thick basal lip.

Diam. 14 mill. *Hab. unknown.*

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L. CLATHRATA, Reeve. Pl. 36, fig. 95.

Somewhat discoidal, with rounded whorls, regularly latticed by equidistant spiral and longitudinal ridges, the former more prominent, lip varicose, umbilicus very large. Diam. 12 mill.

Philippines, Australia.

L. GRANULOSA, Dunker. Pl. 36, fig. 96.

Depressed subglobose, with rounded whorls, with spiral riblets, which above are granular, umbilicus wide; whitish or rosy, sometimes white with the ribs colored. Diam. 6·4 mill.

Cape of Good Hope, Mauritius

It is *Monilea spuria*, of Gould.

T. SEMICLATHRATULA, Schrenck. Pl. 36, figs. 98–100.

Depressed turbinate, whitish, spirally costate, the costæ slightly tuberculate above, suture channeled, lip crenately varicose, umbilicus large, bicarinate within, crenulately margined.

Diam. 6·25 mill.

Amur region, E. Asia.

L. FENESTRATA, Carp. Pl. 36, fig. 97.

Depressed, clathrate by equidistant spiral and radiating riblets, with deep interstices, sculpture terminating with a spiral ridge surrounding the rather wide, deep umbilicus. Diam. 4·5 mill.

Catalina Isl., California.

L. ACUTICOSTATA, Carp. Pl. 36, fig. 1.

Turbinate, with revolving riblets, which are more or less nodose above, imperforate. Diam. 4 mill.

Catalina Isl., California.

L. CANCELLATA, Gray. Pl. 36, fig. 2.

Turbinate, whorls convex, regularly latticed with equidistant spiral and longitudinal ribs, umbilicus moderate, defined by a spiral rib. Diam. 5 mill.

Cobija, Peru.

L. Cobijensis, Reeve is a synonym.

Has the sculpture and umbilicus of *L. fenestrata*, Carp., but is more elevated.

L. DISCOIDEA, Reeve. Pl. 36, fig. 3.

Discoidal, with flattened spire, periphery with two prominent ribs, connected by lattices which subspinously project, surface with clathrate ridges, the interstices of which are finely striated.

Philippines.

No dimensions are given, but the figure is said to be magnified.

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L. ANGASI, Crosse. Pl. 36, fig. 4.

Moderately umbilicated, strong, solid, light brownish or greyish, with about five strong revolving series of rounded tubercles, the last defining the umbilicus, peristome tubercularly varicose.

Diam. 3 mill.

Port Jackson, Australia.

L. SPECIOSA, Angas. Pl. 36, figs. 5, 7, 8.

Rather solid, depressly orbicular, pale brown, with three prominent spiral ribs, and longitudinally finely, distantly plicate, the intersections nodose, suture excavated, umbilicus moderate, encircled by a rib, its walls decussated with concentric and radiating striæ, outer lip a little thickened, with continuous peristome.

Diam. 2 mill.

Port Jackson, Australia.

Notwithstanding some differences in the descriptions, I think this will prove synonymous with the preceding species.

L. Gowllandi, Brazier (figs. 7, 8) appears to me to be synomymous, judging from description and figure. Mr. Brazier states that it approaches closely to *L. speciosa*, but does not give distinctive characters. It comes from Percy Isl., N. E. coast of Australia.

L. ASTERISCUS, Gould. Pl. 36, fig. 6.

Solid, brownish white, with about twenty radiating ribs, cut by a subsutural sulcus, another at the periphery and a third around the moderate umbilicus; whorls 4, convex, very minutely spirally striate. Diam. 1·5 mill.

Hong Kong.

Figured from a type specimen. Too close to the two preceding species.

L. SIDEREA, Reeve. Pl. 36, fig. 10.

Depressed turbinate, with three prominent spiral ribs on the middle of the body whorl, and smaller ones above and below them, crossed by distant, sharp longitudinal ribs, forming nodosely spinous intersections, suture deeply channeled, umbilicus very wide, perspective.

Philippines.

The peculiarity of the species is its star-like projection of tubercles on the periphery of the whorls. The figure is enlarged, and dimensions not given.

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L. BELLULA, H. Adams. Pl. 36, fig. 11.

Widely umbilicated, somewhat solid, whitish, cancellated by distant longitudinal and spiral sculpture, suture crenulated; whorls 3½, tabulate above, the last crenulately, carinate at the periphery and on the base; umbilicus scalariform, with a marginal crenulated rib, and another interior rib. Diam. 2·5 mill.

Persian Gulf.

L. KIENERI, Phil. Pl. 36, fig. 14.

Planorbiform, encircled by three distant, sharp ribs on the middle of the last whorl, and smaller ones above and below them, clathrate by distant, sharp radiating ridges, the intersections nodosely spinous, umbilicus very wide, perspective. Diam. 10 mill.

St. Thomas, W. I. (Swift), *Philippines* (Cuming).

Described by Kiener as *L. cancellata*, preoccupied by Gray.

L. ANNULATA, Tenison-Woods. Pl. 36, fig. 20.

Planorbiform, opaque white, flattened above, rounded below, with somewhat distant longitudinal lamellæ, above and below, otherwise smooth, umbilicus wide. Diam. 1·5 mill.

Blackman's Bay, Tasmania.

One of the ring-like lamellæ forms the peristome.

Section ARENE, H. and A. Adams, 1854.

L. RADIATA, Kiener. Pl. 36, fig. 9.

Subtrochiform, spire exserted, with deep suture, periphery strongly carinate, with scale-like spines, radiately striate, one or more tuberculate or shortly spinose cinguli below the periphery; base granularly concentrically striate, umbilicus large, encircled by two or three granular riblets, white, with radiating red strigations.

Diam. 12–15 mill.

West Indies.

The locality "Indian Seas" given by Kiener, is very questionable.

L. CRENATA, Kiener. Pl. 36, figs. 12, 13.

Depressed turbinated, spire whorls somewhat exserted, all showing a pair of peripheral keels, which are strongly, or subspinosely crenulated, whorls encircled by a spiral series of granules above, base smooth, umbilicus moderate, defined by a riblet; peristome strongly crenately varicose; whitish stained with chestnut. Diam. 15 mill.

Philippines (Cuming).

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L. STELLARIS, Ads. and Reeve. Pl. 36, fig. 15.

Discoidal, flat and smooth above, with a spinose periphery, scaly-spinose and convex below; whitish, tinged with chestnut.

Diam. 18 mill. *Eastern Seas.*

L. MURICATA, Reeve. Pl. 36, figs. 16, 17.

Rather narrowly umbilicated, pale orange yellow, radiated and spotted with a reddish chestnut, whorls with three scaly-prickly keels at the periphery, slopingly flattened above, suture excavated, surface above and below with minutely beaded revolving striæ.

Diam. 12–20 mill.

Australia, Philippines.

L. TAMSIANA, Dunker. Pl. 36, fig. 21.

Moderately umbilicated, whorls with three somewhat distant spiral tuberculated ridges, shouldered above, spire exserted, suture excavated, base with less conspicuous series of beaded striæ, a stronger one surrounding the umbilicus; peristome crenately varicose; whitish, distantly rayed with chestnut. Diam. 4 mill.

Pto. Cabello, Venezuela.

Subgenus LIOTINA, Munier-Chalmas, 1877.

L. AUSTRALIS, Kiener. Pl. 36, figs. 18, 19.

Rather widely umbilicated, white, whorls rounded, with spiral riblets and longitudinal striæ, a beaded riblet winds into the umbilicus; peristome varicose, the inner margin produced below and above.

Diam. 14 mill. *Australia, Polynesia.*

This, the only living example of the group, has also been referred by Mr. A. Adams to *Cynisca* (p. 107).

Unfigured species of Liotia.

L. DAEDALA and L. TANTILLA, A. Ad. *Japan.*
L. PAULLA, Phil. *China Sea.*
L. LOCULOSA (*Loo Choo*), L. FULGENS (*Cape*), L. SOLIDULA (*China*) of Gould.
L. ARMATA, A. Ad. *Korea Strait.*
L. CARINATA, L. STRIULATA, L. ADAMSI, Carp. *Mazatlan.*
L. COMPACTA, and L. LODDERÆ, Petterd. *Tasmania.*
L. INCERTA, L. TASMANICA, Tenison-Woods. *Tasmania.*
L. PILULA, Dunker (= *Collonia*), *Japan.*
? L. BRYAREUS, Dall. *Off Havana, Cuba.*
L. SHANDI, Hutton (? = Turbo). *New Zealand.*

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INDEX AND SYNONYMY.

NERITIDÆ, ADEORBIIDÆ, CYCLOSTREMATIDÆ, LIOTIIDÆ.

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MANUAL OF CONCHOLOGY.

VOL. X, PART SECOND.

MONOGRAPHS OF THE TURBINIDÆ AND TROCHIDÆ,

BY H. A. PILSBRY,
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FAMILY *TURBINIDÆ.*

Animal with an oval, broad or narrow foot, truncated anteriorly; rostrum rather short, truncate; tentacles long, slender, cylindrical, the eyes on peduncles at their exterior bases. Across the front of the head, between the tentacles extends the more or less developed "veil"; and from a point below the tentacles, a fleshy ridge, the "epipodial line" extends backward parallel with the margins of the foot, and bearing usually several slender cirrhi on either side.

Radula rhipidoglossate, usually with the formula $\infty \cdot 5 \cdot 1 \cdot 5 \cdot \infty$, but sometimes lacking the median and one outer lateral tooth. The lateral teeth are all of nearly the same form; so that a transverse row of teeth shows only three distinct forms. Jaws usually present.

Shell turbinate or trochiform, generally solid, smooth or rugulose; aperture circular, oval or subtetragonal; peristome simple. Operculum calcareous, heavy, flat or concave with a thin corneous layer internally, convex and calcareous externally, the nucleus multispiral and either subcentral or at the margin.

The nervous system is chiastoneurous; (i. e. the viceral nervous loop surrounding the intestine is thrown into a figure 8 form—the right cord passing above the left—by that torsion of the viceral mass which brings the outlet of the digestive tract to the right side of the neck.)

The *Turbinidæ* are mostly litoral in station, and inhabitants of tropical and subtropical seas. They are herbivorous.

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Dr. Paul Fischer, in his excellent *Manuel de Conchyliologie*, divides the *Turbinidæ* into three subfamilies, defined as follows:

"I, *Phasianellinæ*—shell not nacreous; II, *Turbininæ*—shell nacreous; outer surface of operculum with few whorls; III, *Cyclonematinæ*,—shell nacreous, outer surface of operculum conical, elevated, scalariform, with very numerous whorls."

The last group, embracing *Cyclonema* Hall, *Oriostoma* Munier-Chalmas, and other exclusively fossil genera will not be further considered here.

Contrary to the usual custom, the more aberrant subfamily, *Phasianellinæ*, will be considered before taking up the *Turbininæ*; this course being less objectionable than the unnatural sequence of groups which would result from interpolating the Phasianellæ between the Turbines and the Trochids.

Subfamily PHASIANELLINÆ.

Shell bulimiform or subglobose, polished, without epidermis or nacre, variegated with bright colors; operculum heavy, calcareous, internally paucispiral, with nucleus near the basal margin, externally convex, white; animal with long tentacles, and usually pectinated head lobes; epipodial line generally with cirrhi; branchial plume long; foot narrow, long, pointed posteriorly, rounded before, below divided longitudinally by a median groove; jaws rhomboidal, covered with imbricating scales. Radula rather short; formula of teeth typically $\infty \cdot 5 \cdot 1 \cdot 5 \cdot \infty$, but sometimes lacking the median and outer lateral teeth.

The considerable diversity which has been observed in the dentition of the *Phasianellinæ* renders a brief review of our knowledge of that organ in the various groups desirable. Unfortunately the soft parts of *Eucosmia*, *Chromotis* and *Alcyna* have not been observed; and I have been unable to obtain specimens of them containing the animal.

Phasianella (typical). The radula of *P. australis* has been figured by Eberhard. A transverse row of teeth forms a w-shaped line. The median tooth is wide, oval, a simple plate, without cusp, overlying the bases of the inner laterals; the lateral teeth ("Zwischenplatten" of Troschel) are of a rhomboidal form, and bear well developed cusps with a long and several small denticles; the outer (fifth) one is narrow; marginals ("Seitenplatten") with long simple cusps, except the inner, which bears accessory small denticles

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at the base of the cusp. (Pl. 61, fig. 1.) It is desirable that additional specimens be examined.

Tricolia. The type species, *P. speciosa*, has a broad simple median tooth, overlying the bases of the inner laterals; these are sub-rhomboidal, produced at their outer angles into wings which overlie the bases of the adjacent tooth outward, and have denticulate cusps. The outer lateral is narrow, not produced on the outer angle. The marginal teeth have long simple cusps. (pl. 60, fig. 72.) Troschel has figured the radulæ of *P. pulla*, (pl. 61, fig. 2.) *P. Kochii* and *P. capensis*, all agreeing with *P. speciosa*. The following also I have found to be of the same type; *P. tenuis*, *P. umbilicata*, *P. compta*, *P. affinis*, *P. fordiana*. The jaws of the latter species are figured (pl. 60, fig. 69). Several of these species lack the outer lateral tooth, the formula being $\infty \cdot 4 \cdot 1 \cdot 4 \cdot \infty$.

Orthomesus. In this group the median tooth is reduced to a linear rudiment or wholly absent. The lateral teeth are of a squareish form, their outer angles scarcely or not at all "winged," and but slightly or not at all projecting over the adjacent tooth. They form straight rows across the middle of the membrane, not V-shaped, as in the preceding groups. In the typical species, *P. variegata*, the laterals bear long cusps, with minute spurs at their bases; the inner marginals are very large, with enormous cusps, the outer ones with long denticulate or laciniate cusps (pl. 61, figs. 3, 4.) Troschel figures this type of dentition for *P. variegata*, *P. flammulata*, Phil. and *P. lineolata*. I have found the same in *P. nivosa* Rve., (=*P. variegata* Lam.). In *P. virgo* Angas (pl. 60, fig. 70) I have found an extremely peculiar and interesting modification of the *Orthomesus* type of dentition. The two inner lateral teeth are united by their inner edges, forming a pseudo-median tooth; the free laterals remaining are three in number on either side, and are of the same form as the one shown in the figure. As in the smaller species of *Tricolia*, the narrow outer (fifth) lateral has evidently been lost. The marginals all have long laciniate cusps. The lateral teeth have the basal plate projecting at the upper outer angle, forming a sort of hood, which reminds one of a similar structure in the median teeth of *Littorina*. This "hood," marked *a* in the figures, is probably homologous with the similarly marked basal plate which projects above the cusps in *P. variegata*, etc. The reduction in number of the teeth in this form is probably due to the same cause which has, I believe, acted in the more minute members of the Pulmonata and other groups which

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have numerous teeth; if the individual teeth were reduced in size in the proportion that the shell is, they would be too minute to fulfil their function as efficient rasps.

The *Phasianellinæ* have been monographed by

Philippi, in Küster's Conchylien Cabinet, 1853.

Reeve, in the Conchologia Iconica, 1862.

Fischer, in Kiener's Coquilles Vivants, 1873.

Sowerby, in the Thesaurus Conchyliorum, 1884.

Philippi's work is perhaps the best; but he describes many species characterized only by the color-pattern. Reeve unites all the smaller and more difficult species, and redescribes most of the larger several times. Fischer's work includes only a few species, but these are well described and beautifully figured.

Key to subgenera.

Columella smooth, arcuate, not dentate, shell ovate, elongated, imperforate; radula with median teeth.

Large species; head with frontal lobes. . . *Phasianella.*

Small species; head without frontal lobes. . . *Tricolia.*

Shell as in Phasianella; radula without median teeth. *Orthomesus.*

Shell subglobular, small, imperforate; aperture large. *Chromotis.*

Shell minute, globose, umbilicate. . . . . *Eucosmia.*

Columella with a strong curved denticle. . . . *Alcyna.*

Genus PHASIANELLA Lam., 1804.

Shell bulimiform or oval; columella smooth, concave. Type, *P. australis* Gmel.

Eutropia (Leach) Gray is a synonym.

Subgenus PHASIANELLA *s. str.*

Shell rather large, bulimiform, imperforate; epipodial line bearing cirrhi; head with pectinated frontal lobes.

S. African and Australian Provinces.

P. AUSTRALIS Gmelin, 1788. Pl. 37, figs. 22–28. Pl. 38, fig. 46.

Shell large, elongated, rather thin, pointed-ovate; spire conical, elevated; whorls 7–8, somewhat convex, slightly flattened below the sutures; aperture long-ovate, somewhat pyriform, usually less than half the total length of shell; outer lip thin; columella with more or less white shining callus; surface "variously longitudinally cloud-

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ed and transversely articulated with red and purple olive" on a polished flesh-colored, cream or white ground. Alt. 50–100 mill.

Tasmania; South Australia.

The synonyms are *Buccinum tritonis*, etc., Chemnitz, *P. tritonis*, Auct., *P. bulimoides* and *P. varia* Lam., *P. picta* DeBlain, *P. lehmanni* and *P. preissi* Mke., *P. decorata* Chenu.

Specimens are frequently found exceeding the dimensions given above. The color pattern is extremely variable, as is shown by the figures. There is one form which is omitted in my illustrations; it is of a pinkish-cream color, with rather distant, narrow, spiral white and deep red articulations. The form is either very elongated, or rather short; it is always, however, longer and with much less convex whorls than *P. ventricosa.*

Var. VENUSTA Reeve, 1862. Pl. 37, fig. 24.

Entire surface tessellated by revolving series of squarish red blotches.

A variety is figured (Pl. 37, fig. 26) which reverses the arrangement of colors in *venusta.*

Var. SUBSANGUINEA Pilsbry, 1888. Pl. 38, fig. 52.

Shell turreted, elongated; painted with broad longitudinal irregular deep red stripes; aperture small.

P. VENTRICOSA Quoy et Gaim., 1833. Pl. 38, figs. 39–43.

Shell large, solid, ovate; spire conic, short; whorls 6, very convex, except immediately below the deeply impressed sutures; aperture ovate, acutely angular above, broadly rounded below, usually exceeding half the entire length of shell; surface polished, light colored, variously marked with revolving series of arrow-shaped, square or oblong blotches, or longitudinally striped with white-edged pinkish-purple festoons, or broad crimson flammules.

Alt. 40 mill.

S. Australia; Tasmania.

A deep water form. As noted under the last species, size and color are very variable.

The synonyms are: *P. sanguinea* (figs. 40, 45) *P. venosa* (fig. 39) of Reeve; *P. perdix* (Gray) Phil., *P. turgida* Phil., = *P. brevis* Mke.; *P. solida* Desh., of Kiener, *P. delessertii* Chenu, and probably *P. ventricosa* and *P. inflata* Swainson, and *P. articulata* Anton.

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Var. ZEBRA Reeve, 1862. Pl. 38, fig. 43.

"Obliquely, longitudinally, conspicuously, broadly banded with chestnut red and yellow, lineated with flesh-color."

Swan River, Australia.

Var. RETICULATA, Reeve 1862. Pl. 38, fig. 42.

"Closely undulately painted throughout with brown lines and with flesh-colored flames beneath the sutures." Shorter than the type.

Swan River and St. Vincent's Gulf, Australia.

P. ÆTHIOPICA Phil., 1853. Pl. 38, figs. 53, 54; Pl. 39, fig. 94.

Pointed-ovate, thick, solid; whorls 5–6, moderately convex, sloping below the sutures; aperture about half the length of shell, oblique, ovate; columella with heavy white or rosy callus, thickened and subdentate near posterior angle of aperture; color, light brown or rose, with revolving series of arrow-shaped or irregular flecks of lighter shade, or with longitudinal oblique light stripes extending downward to middle of body whorl, *apex and base stained with rose color.* Alt. 25–30 mill. *Seychelles* (Reeve); *Australia*(?);

E. coast of Africa; Zanzibar (*Philippi*).

I am inclined to believe that this is the *Helix solida* of Born, (1780). The latter has been ignored by modern authors. On my plate 39*a*, fig. 8, one of the original figures given by Born is copied. Compare also *P. unifascialis* Kiener, which has somewhat the same color pattern as *P. solida*, and may be the same.

P. HISTRIO Reeve, 1862. Pl. 37, figs. 34, 35.

"Shell conically turbinated, amber, flaked with white, spotted at the sutures with deep crimson-rose; spire rather exserted, whorls rounded; aperture small." Alt. 10 mill.

Philippines (*Cuming.*)

"A very peculiarly marked species, the colors being of a delicate transparent kind, edged with brilliant crimson-rose."

Reeve's description and figure are above copied.

P. COTURNIX (Koch) Philippi, 1853. Pl. 39*a*, fig. 17.

This is a species of about 15 mill. alt., rather solid, very smooth and shining; aperture ovate, with rather heavy columella and inner lip; the color consists of a whitish ground with yellow flames, which behind are bordered with dark and brown, and in front are diffused in the clear ground-color, which here and there shows undulating

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yellowish longitudinal lines. There is no trace whatever of spiral lines; and in this respect *T. coturnix* differs wholly from *T. flammulata*, a species otherwise very similar.

Habitat unknown.

All the information given by Philippi may be obtained from the above paragraph, and from the figure, which is a copy of the original

Subgenus TRICOLIA Risso, 1826.

Shell small; head without frontal lobes. Type, *P. speciosa* Mühlf.

All tropical and subtropical seas.

I have included in this group most of the smaller species, although the characters of the animal have not been described in the larger number of them. The dentition in the type species, *P. speciosa*, is not very different from that of the typical species of *Phasianella*. The synonymy includes *Tricoliella* Monts., 1884, type, *P. pulla* L., (not *intermedia* Sc. as stated by some authors), and *Eudora* Leach, 1852, type *P. pulla* L. Troschel wholly mistook the characters and limits of this group; a fact which should be born in mind when studying his figures and descriptions.

P. SPECIOSA Mühlf., 1824. Pl. 37, figs. 29–33.

Shell ovate-elongate, thin, shining, white, with alternate red and white short flammules below the sutures, and several revolving series of white spots, the interstices covered with fine pink or yellowish obliquely descending lines; whorls 5, convex, separated by deeply constricting sutures; aperture long-oval, rather produced below, the posterior angle occupied by a heavy callus. Alt. 13, diam 6 mill.

Mediterranean and Adriatic Seas.

The following are synonyms: *P. nicœensis* Risso, *P. vieuxii* Payr., *P. ferussaci* Guer-Mén., and *P. lymnœoides* Anton.

Var. RUBRA, Risso, 1826. Pl. 37, fig. 32.

Uniform carmine, with a series of subsutural white flammules.

Var. *sanguinea* Monts. and var. *purpurea* Dautz., are synonyms.

Var. MAJOR Monts., alt. 18 mill.; LACTEA Monts., a white form; ATRA Monts., brown in color; MARMORATA Monts., with large zigzag white flammules; MACULATA Monts., an irregularly white maculated variety; SPIRO-LINEATA Monts., fig. 30, are the principal color varieties.

This species is found fossil in the Italian pliocene.

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P. TENUIS Michaud, 1829. Pl. 39, figs. 77–80.

Rather thin, shining, oval, elongated; spire elevated, conic, composed of 4–5 somewhat convex whorls, separated by slightly impressed sutures; aperture rounded oval; columella arcuate; color yellowish or rose, with red and white flammules and decurrent lines, sometimes punctate with red. Alt. 10 mill.

Mediterranean and Adriatic; rarely on the Atlantic coast of France.

P. intermedia Scacchi is a synonym.

Intermediate in form between *speciosa* and *pulla*. The sutures are not so deeply impressed as in the first, and it is more elongated than the latter. It exhibits the same color varieties as *P. speciosa*.

P. PULLA Linn., 1758. Pl. 38, figs. 56–60.

Shell ovate-pointed, solid, subtranslucent, more or less elongate; spire short, conic; whorls about 4, more or less convex, with deep sutures; aperture large, short oval; color crimson, yellowish or white, above generally longitudinally flammulate with red, white or deep brown, below with one or more revolving serrate bands of the same colors, and all over minutely punctate with red or with fine oblique reddish lines. Alt. 9 mill.

Mediterranean and Adriatic Seas; English coast; Canaries and Azores.

The following are synonyms: *P. pulchella* Recluz (Pl. 39*a*, fig. 20), *P. punctata* Risso, *P. tenius* Phil., *P. flammeus* Von Salis, *P. exigua* (?) *P. Höberti* and *P. striata* Brus., *P. varians* Leach, *P. crassa* Brus., *Turbo pictus* DaCosta, and *P. pullulus* Anton. There are many color varieties; but these are founded on such slight characters that they are scarcely worth naming.

Var. ELONGATA Krauss, 1848. Pl. 39*a*, figs. 23–25.

More elongated, last whorl more drawn out longitudinally, the penultimate one rather large and very convex; coloration as in *P. pulla*, with bold subsutural flammules, and revolving bands below.

Cape Region, S. Africa.

Var. STRIGATA Phil., 1853. Pl. 39*a*, fig. 13.

Shell elongated, with yellowish-white ground-color marked with narrow red lines, a subsutural series of brown flammules, and a submedian girdle of diamond-shaped red blotches; umbilicus marked by a slight fissure. Alt. 12 mill.

Habitat unknown.

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Var. DUBIA Pilsbry. Pl. 38, fig. 61.

"Rather transparent, conspicuously distantly striped with deep purple-red; whorls contracted round the upper part, then rounded; aperture small."

Mouth of Gaboon River, W. Africa.

This is *P. strigata* Reeve, 1862. I have seen neither this form nor the preceding; but they seem to me scarcely distinct from *P. pulla.*

P. PETITI Craven, 1882. Pl. 39, figs. 84, 85.

Shell very small, subrimate, shining, microscopically spirally striate; color corneous with irregular spots of reddish brown, except immediately below sutures, where they are replaced by a band of alternate oblique white, cream and reddish flammules; whorls 4½, very rapidly increasing; apex obtuse; aperture subcircular, colored inside, the same as outside; columella a little thickened, white; suture deep. There is sometimes a band of large blotches on periphery. Alt. 3, diam. 1½ mill.

Mouth of Congo River, W. Africa.

P. DEANIANA Pilsbry, 1888. Pl. 64, figs. 40–43.

Shell rather thin, ovate-conic, subtranslucent, corneous or orange-colored, marked with very distinct round or oval dots of deep crimson, scattered over the surface or gathered around the base and suture, sometimes with large maculations of opaque white; spire conic, apex acute; whorls 5, moderately convex, often obtusely angular and with a light or translucent girdle around the base; aperture ovate, slightly less than half the total length of shell, showing the coloration inside; columella thin; generally imperforate, sometimes lacunate in large specimens. Alt. 5–6, diam. 3½ mill.

Corisco, W. Africa.

This lovely little species is allied to the preceding, but differs in the longer, conic, acute spire, larger size, and the pattern of coloration.

I am indebted to Rev. A. Dean, of Muncy, Pa., for numerous specimens.

P. VITREA Desh., 1863. Pl. 39, fig. 83.

"Shell ovate-turbinate; apex rather obtuse; very smooth, shining, polished, diaphanous-white; whorls 6, convex, the last large; base obtuse, imperforate; aperture ovate; operculum white, solid, convex." Alt. 7, diam. 4 mill.

Ins. Réunion.

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P. CAPENSIS Dunker, 1846. Pl. 39, figs. 86–88.

Shell small, ovate-oblong, subacute, solid, usually brown or rosy with white flecks or zigzag lines, sometimes unicolored, or encircled by red spiral bands; whorls 5, somewhat convex, sutures distinct, last whorl tumid; aperture rounded, half the length of shell; columella white or tinted, flattened. Alt. 6, diam. 4 mill.

Cape of Good Hope; *Mauritius*.

P. KOCHI Phil., 1847. Pl. 37, figs. 37, 38.

Shell short-ovate, solid, with short conic spire; whorls 5, rapidly increasing, convex, the last large; aperture large, roundly ovate; columella flattened; color deep rose, sometimes yellow, above with light flammules radiating from the sutures, below with a revolving serrate light band, the entire surface minutely mottled with white and rose. Alt. 9 mill.

South Africa; *Mauritius*; *Port Jackson, Australia* (*Angas.*)

The markings above described are occasionally obsolete. There are several flesh colored specimens before me. Fresh shells sometimes show ill defined revolving striæ. It is extremely similar to *P. pulla* in coloration, but is more globose. Probably this species and *P. capensis* will prove to be identical, the latter name having priority. Both are, I believe, quite distinct from *P. pulla* L.

P. AFFINIS C. B. Adams, 1850. Pl. 39, figs. 1, 2.

Shell pointed ovate, elongate, rather thin, smooth, shining; spire conic, of about 5 rather convex whorls, separated by well impressed sutures; apex acute, rose colored; aperture oblique, oval, outer lip thin, translucent; columella with a white callus which is somewhat distended at the slightly impressed and grooved sub-perforate or imperforate umbilical region; color white, yellow or pale rose, more or less clouded longitudinally with rose, orange or brown, sometimes only with subsutural and peripheral series of short flammules, *the entire surface closely and regularly punctate with pink or orange*, and white. Alt. 8, diam 4 mill.

West Indies; *Florida* (*Simpson*).

The synonyms are *P. brevis* C. B. Ad., and its synonym *P. adamsi* Phil., and *P. concinna*, C. B. Ad.

P. TESSELLATA Potiez et Michaud, 1838. Pl. 39, figs. 99, 100.

Short solid, smooth, oval or ovate, spire conic, apex obtuse; whorls 4 to 5, slightly convex, rapidly increasing, the last large and obtusely

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angulate at periphery; sutures lightly impressed; aperture oblique, ovate, outer and inner margins equally curved; columella with a white callus; umbilical region excavated, and usually obviously perforated; color white, yellow or reddish, longitudinally clouded with white, red or brown, sometimes broken into subsutural and peripheral series of flammules, *encircled with close continuous narrow revolving obliquely descending, regularly spaced orange or red lines.*

Alt. 5½ diam. 3½ mill.

West Indies.

P. minuta Anton (?), *P. zebrina* d'Orb. (figs. 99, 100.), and *P. tesselata* C. B. Ad. are synonyms.

This species and the *P. affinis* are very abundant in many West Indian localities. They are usually associated together. Fresh specimens of both exhibit microscopic revolving impressed striæ. Reeve, who has subdivided the larger species of this genus so minutely, "lumps" these forms, with most of the other small species, under *P. pulla* L. I have never seen a specimen among hundreds I have examined from the West Indies which could not be most readily separated from the Mediterranean shell. Indeed both *affinis* and *tessellata* exhibit a surprising uniformity in color-pattern and form. The dentition of *affinis* differs from that of *pulla*. *P. perforata* Phil. I should be inclined to unite with *tessellata* were it not from the West Coast.

The *P. concolor* of Adams I have identified with a rather rare color-variety which generally occurs with *P. tessellata*. It is extremely dark, almost unicolored; but with a glass one can perceive still darker diagonal lines upon the surface. This form is figured on Pl. 45, fig. 1. The following description is from the original one of Adams:

P. concolor C. B. Adams, 1850.

Shell rather long ovate-conic; uniform glossy brown, rarely with a sutural band of a deeper shade of the same; surface polished, apex rather obtuse; sutures impressed; spire with nearly rectilinear outlines; whorls 5, convex, the last subangular; aperture ovate; columella with a thick deposit, and with an umbilical indentation.

Alt. 2½ mill. *Jamaica.*

P. UMBILICATA d'Orb., 1853. Pl. 39, figs. 95, 3, 4.

Shell ovate-conic, composed of 5 very convex whorls, separated by deeply impressed sutures, and encircled by rather coarse revolv-

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ing impressed lines; spire conic, the upper whorls sometimes carinate or biangulate from the prominence of one or more of the revolving striæ; last whorl obscurely angular around the lower part, sometimes rather acutely carinate above the periphery; aperture less than half the length of shell, rounded ovate, columella arched, scarcely thickened; umbilical region deeply grooved and narrowly umbilicate; color white, sparsely punctate with red, more or less flammulate longitudinally with red and white. Alt. 5 mill.

Cuba; Florida.

The revolving striæ are entirely wanting on some individuals. There is great variation in the degree of exsertion of spire, some shells attaining a length nearly double that given above.

The more stable characters of the shell are its narrow but decided umbilicus, and the very convex whorls.

D'Orbigny described the *smooth* form of this species, as will be seen by his diagnosis translated below:

"Shell elongate, thin, smooth, umbilicate, punctate with red, maculate with red and white; spire elevated, apex acute, whorls 5, convex, separated, the last anteriorly subangulate; aperture oval."

P. PERFORATA Phil., 1848. Pl. 38, fig. 62; Pl. 39*a*, fig. 12.

"Oblong-conoid, perforate, white, subtessellated with oblique purple lines; suture and periphery ornamented with large maculations of white and purple; whorls deeply convex, last subangulate; aperture oblong ovate, equal to spire."

Payta, Panama; Mazatlan.

"This beautiful shell closely resembles the West Indian species. Like many of its congeners, it has parallel diagonal lines of red and brown. The first whorl of the five is discoidal. It is characterized by extremely minute wrinkling over the whole surface, only discernable under the microscope when quite fresh. The umbilicus is very large when young, and sharply keeled; when adult it is often nearly filled up by the callous labium. Operculum radiately wrinkled over a large part of the outer surface; within spire produced, sharply keeled. The largest specimen measures: Alt. ·13, diam. ·12 in." (*Carpenter.*)

My figure on plate 38 is a copy of that given by Reeve. On pl. 39*a*, Philippi's figure is reproduced.

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P. COMPTA Gould, 1857. Pl. 39, figs. 69–72.

Small, pointed-oblong, somewhat solid, yellowish, pinkish or whitish, more or less clouded longitudinally with purple, dull pink or gray, marked with numerous narrow close revolving descending lines of purple, pink or drab, sometimes conspicuously flammulate below the sutures, and broadly transversely fasciate on base; whorls 5–6, closely coiled above, with shallow sutures, the last more rapidly descending, separated by a deep suture; aperture usually less than half the length of shell, very oblique, short ovate, inner margin arcuate, umbilical region excavated and generally minutely perforate. Alt. 8–12 mill.

California.

Radula similar to that of *P. pulla*, but with only 4 lateral teeth on either side, by atrophy of the narrow outer one. Operculum white, inside stained with blue above.

Var. PULLOIDES Cpr.

Somewhat similar to *P. pulla;* solid, compact, with shorter spire; suture distinct.

Sta. Barbara; Monterey; Catalina Id.

Var. ELATIOR Cpr.

Very small, spire elongate, painted as in *P. pulla;* whorls subplanulate, suture scarcely impressed, columella lacunate.

Sta. Barbara, Cal.

Var. PUNCTATA Cpr.

Similar to *P. compta;* more elevated; sutures impressed; whorls tumid, minutely punctate with brown; columella lacunate.

San Diego, Cal.

P. FORDIANA Pilsbry, 1888. Pl. 40, fig. 5.

Shell minute, long-ovate or conoid, composed of 5 convex whorls separated by deep sutures; aperture scarcely more than one-third the length of shell, rotund oval, angled above; outer lip thin; columella scarcely callous; umbilical region indented and in adult shells perforated; color white, minutely dotted with pink or brownish, usually with a subsutural series of short alternate white and red or brown flammules, sometimes repeated on periphery.

Alt. 3, diam. 2 mill.

Singapore (Archer).

This species has something the aspect of a *Rissoa.*

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In old specimens the color pattern is very faint. The radula is that of *Tricolia*. Central teeth broad-oval, submembranous; laterals 5–5, with very broad, expanded peduncles; cusps short, armed with several large acute subequal denticles; outer two laterals narrow. Specimens are in the collection of the Philadelphia Academy, the U. S. National Museum, and the collection of Mr. John Ford of Philadelphia.

P. HUTTONI Pilsbry, 1888. *Unfigured.*

Shell smooth, polished; aperture rounded; color bright glossy rose, generally with oblique white rays; whorls 6½. Alt. 6 mill.

Auckland.

Described by Hutton as *Rissoa flammulata*. This specific name is several times preoccupied in *Phasianella*.

P. ROSEA Angas, 1867. Pl. 39, fig. 92.

"Shell minute thin, shining, ovate, of a uniform deep rosy color throughout; whorls 4, somewhat flattened at the upper part, then convex; columella white; edge and outer lip stained with a line of dark rose." (*Angas.*) Alt. 3, diam. 2 mill.

Coodgee Bay, N. S. Wales; Tasmania.

One of the specimens before me has a subsutural series of short white flammules.

P. DELICATULA Tenison-Woods. *Unfigured.*

"Minute, tumidly ovate, aperture longer than spire, smooth, shining, polished, intense olive, with girdles of fine regular distant spotted white lines, and ornamented with broad flames of clouded chestnut proceeding from sutures; aperture broadly ovate, columella white, conspicuously margined with a spotted olive line; base convex, with punctate lines; operculum bluish white."

Alt. 3½, diam. 2 mill.

Long Bay, Tasmania.

First named *P. pulchella* Tenison-Woods, but changed on account of the preoccupation of that name. The author suggests that it may be a variety of *P. rosea* Angas.

P. PYGMÆA Phil., 1848. Pl. 39*a*, fig. 15.

"The shell is solid for its minute size, long-conoidal, perforate, smooth, shining, white, decorated with a few pale yellow flecks and numerous red points. The whorls, of which I count 5½, are almost cylindrical, and more deeply separated than in any other species;

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the upper ones are somewhat angulate, and the last scarcely exceeds one-third of the entire altitude. The aperture is nearly circular."

Alt. 4 mill. *Habitat unknown.*

Philippi's description is translated above.

P. GUTTATA Phil., 1853. Pl. 39*a*, fig. 16.

Shell ovate-conoid, imperforate, very smooth and shining, whorls very convex, rapidly increasing, the last over three-fifths the entire altitude; aperture broad-ovate, nearly circular. One example is brown with green spots ["Tropfen"] which are sometimes bordered on one side with dark brown; in the other specimen the ground-color is brownish rose-red, and the "drops" have united into yellowish-white longitudinal flammules; the spire is brownish purple in both. Alt. 4 mill. *Habitat unknown.*

Description and figure are from Philippi.

P. INCONSPICUA Phil., 1853. Pl. 39*a*, fig. 19.

Shell ovate-conoid, *perforate*, very smooth and shining; whorls 5½, very convex, and rapidly increasing, the last three-fifths of the total length; spire conic, but apical whorl blunt, white; the following whorls reddish brown, with oblique white brown-bordered flammules above, apparently unicolored brown below, excepting a series of white flecks around the umbilicus, but upon close inspection showing very oblique brown lines as in *P. minuta* [= *tessellata* P. et M.] and *P. perforata*. Alt. 5 mill. *Habitat unknown.*

From *P. minuta* and *P. perforata* it is distinguished by the more rapidly increasing whorls, etc; from *P. guttata* it is separated by the umbilical perforation. My description and figure are from Philippi.

P. FULGENS (Koch) Phil., 1853. Pl. 39*a*, fig. 18.

"The shell is thin, imperforate, steeple-shaped, acute, smooth and very shining, unicolored olive brown. Only a narrow border on the columella is white. The 7 whorls of which it is composed are but slightly convex, especially above; the last attains almost half the altitude of the shell; the aperture is ovate, acute above." (*Philippi.*)

Alt. 8, diam. 5 mill. *West Coast of Australia.*

Very distinct, says Philippi, by the turreted form, the nearly plane whorls and the uniform coloration. I have not seen the species.

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P. VARIABILIS Pease, 1860. Pl. 39*a*, figs. 21, 22.

"Shell small, thin, ovate, shining; whorls 3–4, convexly rounded, marked with very fine oblique longitudinal striæ; inner lip callous, slightly expanded at the base, indented at the umbilical region and with a groove behind the inner lip; aperture ovate; color white, variously painted with pink lines and blotches, the lines fine, oblique, extending over a portion of the whorls, sometimes flexuous and covering the whole surface; blotches of a longitudinal shape; periphery of last whorl usually ornamented with a row of pink spots." (*Pease*) Alt. 3, diam. 2 mill.

Sandwich Is.

This is *Collonia variabilis* Pse. My figures are drawn from specimens received from Mr. Pease.

P. BICARINATA Dunker, 1846. Pl. 39*a*, fig. 10.

Shell small, somewhat solid, ovate-conic, rose colored, variegated with white, transversely lightly striate; whorls somewhat convex, the last obsoletely bicarinate. Alt. 4 mill.

Cape of Good Hope.

P. MUNIERI Vélain, 1877. Pl. 39, figs. 89–91.

Rather thick, white or slightly greenish, turbinate, short, spire slightly exserted; whorls 4 very rapidly increasing, the upper ones narrow, rounded and convex, the last very large, rather flattened above, surface smooth or slightly irregularly striate above; aperture oblique, oval, sub-circular, columellar margin somewhat thickened and strongly concave; operculum as usual in the genus.

Alt. 3 mill. *Ins. St. Paul.*

P. brevis Vélain (fig. 91) seems to me to be identical; the name is preoccupied. This species seems to form a passage to *Chromotis*.

Subgenus CHROMOTIS A. Adams, 1863.

Shell subglobose, auriform; spire very short; whorls few, rapidly increasing; aperture large, oval; operculum as in *Phasianella*.

S. African Province.

P. NERITINA Dunker, 1846. Pl. 40, figs. 10, 11.

Small, subglobose, smooth, rather solid, composed of about 3 convex rapidly increasing volutions, the last descending toward aperture, and rather flat on the superior portion; aperture very oblique, large, two thirds the entire length of shell, roundly oval, outer lip thin, columella arched, flattened, with a rather heavy

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white callus; umbilical region excavated; color white, with numerous narrow red revolving, obliquely descending lines.

Alt. 5, diam. 5 mill. *Cape of Good Hope.*

Subgenus EUCOSMIA Carpenter, 1864.

"Shell solid, shining, variegated, not nacreous; aperture and whorls rounded; conspicuously umbilicated; peritreme scarcely continuous, not callous." type, *E. variegata* Carp.

Californian Province.

No species of *Eucosmia* have been figured, and I have no specimens. My descriptions are taken from the original ones of Carpenter.

P. VARIEGATA Carpenter, 1864. *Unfigured.*

Shell small, smooth, turbinate, bright, outlines of spire convex, variously maculated with rose color and reddish brown; whorls normally 4, very convex, rapidly increasing, the last one produced anteriorly, separated by well impressed sutures; nuclear whorls regular, apex mammillated; base rounded; umbilicus carinated; aperture scarcely indented by parietal margin, peristome nearly continuous, acute. Alt. ·1, diam. ·07 inch.

Cape St. Lucas, L. Cal.

Var. SUBSTRIATA Carpenter.

Form as in *E. variegata*; but whorls, except the nuclear, very delicately striate, the last with about ten striæ.

As the name *variegata* is preoccupied in *Phasianella*, it would be better to use the varietal name, *substriata*, for this species.

P. PUNCTATA Carpenter, 1864. *Unfigured.*

Much larger, more elongated and narrower than *E. variegata*, and more like a *Phasianella*, the greater part densely punctate with brown; umbilicus small; Alt. ·22, diam. ·15 inch.

Cape St. Lucas.

P. CYCLOSTOMA Carpenter, 1864. *Unfigured.*

Shell small, very obtuse, wide, regular, valvatoid, outlines of spire scarcely convex; pale cinereous, densely punctate or maculate with brownish olive; apex pale, mammillated; whorls normally 3, very convex, with deep sutures; aperture scarcely indented parietally; umbilicus large, subspiral. Alt. ·05, diam. ·05 inch.

 Cape St. Lucas.

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P. PHASIANELLA C. B. Ad., 1852. *Unfigured.*

"Shell ovate-conoid; color various, mostly red or brown, sometimes uniform, frequently in dark flammules on a light ground, sometimes with spiral darker stripes or series of spots; surface covered with spiral striæ; apex subacute; spire conoid, with the outlines moderately curvelinear; whorls 5, convex, with a distinct suture; aperture broad ovate, subeffuse; labrum thin; umbilicus very small. Mean divergence about 64°; Alt. ·16, diam. ·11 in. Operculum calcareous, very thick and solid." (*Adams*). *Panama.*

"In the calcareous sand we collected about 112 specimens in various stages of growth" (*Adams*).

This species, the *Turbo* (?) *phasianella* of Adams, is said by Carpenter to be the same as his *P.* (*P. perforata var.* ?) *striulata.* I have seen neither. The description of the latter here follows:

P. STRIULATA Carpenter, 1857. *Unfigured.*

Shell similar to *P. perforata,* but lacking colored lines; punctate and spotted with rufous; spiral striæ below, and in the umbilicus, occasionally upon the spire. Alt. ·09, diam. ·07 in.

Mazatlan.

Only two specimens found. One is very slender, the other of the ordinary form. There is no trace of the minutely wrinkled surface [of *P. perforata*]. (*Carpenter*).

***

P. MINIMA Phil. Vol. ix, Pl. 46, fig. 24.

Ovate globose, thin, bluish black, smooth, slightly striate on last portion, umbilicate; spire short, very obtuse; whorls 3, not convex, last large; aperture oval, lip thin. Alt. 1·5 mill.

Coast of Peru.

Littorina umbilicata d'Orb., preoc. in *Phasianella,* is a synonym.

Has been considered a *Littorina,* but the operculum is that of *Phasianella.*

I do not know that this and the following species belong to *Eucosmia.* They resemble that group in the minute size, umbilicate base and depressed form.

P. BREVIS d'Orb., 1853. Pl. 40, figs. 8, 9.

Shell short, umbilicate, thin, smooth, white, variously flammulate or irregularly maculate with blackish or red; spire very short, obtuse; whorls 4, convex; aperture nearly round. Alt. 1¼ mill.

Cuba.

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The name *brevis* is several times preoccupied in *Phasianella,* but not, I believe, for well established species. However if it be deemed desirable to avoid this duplication, the present species may be called *P. brevissima.*

Subgenus ORTHOMESUS Pilsbry, 1888.

Shell and operculum similar to *Phasianella;* radula with the central tooth reduced to a minute rudiment or absent.

Indo-Pacific Province.

Type, *P. variegata* Lam.

P. VARIEGATA Lam., 1822. Pl. 39, figs. 97, 98.

Shell rather large, ovate-conic, solid; whorls 5, somewhat convex, separated by well marked sutures, somewhat flattened above; spire pointed, conic; aperture rather small, short ovate, less than half the length of shell, widely rounded below, angular above; columella with a flattened callus; parietal wall more or less white callus, and decidedly thickened near the posterior angle; color variable, usually flesh tinted, ashen or brown, more or less clouded with darker and lighter shades, and flammulate with dark and light below the sutures, spirally traversed by *narrow hair-like lines of brown or red interrupted by white dots and intervals,* the white sometimes predominating. Alt. 20–25 mill.

Zanzibar; Red Sea; New Caledonia; Mauritius, etc.

Rather variable in coloration, but the narrow lines,—too narrow to be plainly shown in the figures, and difficult to make out without a glass—are constant.

The synonymy is extensive; including *P. nivosa* (pl. 38, figs. 49, 50) *P. jaspidea,* (fig. 44, 36.) *P. lentiginosa* (fig. 51.) and *P. fulgurata* (fig. 55) of Reeve, *P. grata* (pl. 39*a*, fig. 14), *P. splendida* (pl. 39*a*, fig. 5,) of Philippi, *P. lineolata* Wood, *P. viridis* Anton, and *P. rubens* Lam. The latter I cannot identify; but judging from Philippi's description and figure (pl. 39*a*, figs. 6, 7) of what he supposes to be Lamarck's species, and from Kiener's, (pl. 38, figs. 47, 48) I would place it in the synonymy of *P. variegata.* Philippi gives *Australia* as the locality of *P. rubens. P. broungniarti* Audouin, (Pl. 39, figs. 63–66) is said to belong here. It is from the Red Sea.

P. UNIFASCIALIS Kiener. Pl. 39, fig. 96.

Shell, oval, conic, moderately thick, spire moderately elevated, formed of 5 whorls, not very convex, the last large; aperture large, oval, somewhat angulate above; color orange-red, with a subsutural

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sharply defined fascia of white and brown flammules, and a similar one encircling umbilical region. Alt. 16 mill.

Australia.

No narrow revolving lines are noticed in the description of this species, nor are they visible in the figure. There are however before me specimens which have all the characters of this species, *plus* the capillary lines, and I am inclined to believe it a variety of the *P. variegata.*

P. FLAMMULATA Phil., 1848. Pl. 39*a*, fig. 9.

"The shell is pretty solid, long conoidal, very smooth and very shining, and consists of 6 whorls, which are strongly convex and of which the last is about three-sevenths the entire length. The aperture is ovate, [eiförmig] angular and with a little canal above, caused by a thickening upon the inner wall, which stops just short of the insertion of the outer lip; the coloration, in the numerous examples which I have seen, is very constant; it consists of a yellowish ground-color, merging into olive, with wavy milk-white flames which are anteriorly bounded with dark, posteriorly becoming lost in the ground-color, and still finer undulating parallel lines showing upon the ground color, as well as *spiral rows of milk-white points, which are not connected by brown lines* as in *P. lineolata* and *P. splendida.* Alt. 12 mill. *Red Sea.*

Philippi's somewhat circumstantial description is above translated. The italics are my own. I have seen no specimens of this species, and it is noticed in neither of the three monographies.

P. AMŒNULA Phil., 1853. Pl. 39*a*, fig. 11.

Shell long-ovate, somewhat conic, acute, imperforate, rather thin, translucent, smooth, shining; whorls 6, slightly convex, the last not perceptibly rounded, but with an indication of a carina, somewhat over half the total length; upon a pale flesh-colored ground are numerous spiral bright red lines, punctate with white, and longitudinal wavy flames, which are dark-bordered toward the suture.

Alt. 8 mill. *Australia.*

This species, like the last, has not been seen by me, nor noticed by authors. My description and figure are taken from the original ones.

P. ANGASI Crosse, 1864. Pl. 39, figs, 67, 68.

Shell imperforate, elevated-conic, somewhat solid, smooth, ornamented with minute regular subdistant spiral lines of reddish purple

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articulated with white, at sutures brownish, variegated and flammulate with white; spire subacuminate, apex obtuse, rose colored; whorls 6, slightly convex, the last large, convex; aperture ovate, white, columellar and parietal margins callous. Alt. 24, diam. 12 mill.

Tasmania; Port Elliott, S. Australia.

P. GRAEFFEI Dunker, 1875. Pl. 39, figs. 81, 82.

Small, ovate-pointed, rather thin, smooth, glabrous below sutures, with 6 convex whorls, the apex usually pink, balance of shell light brown or yellowish, with distant narrow revolving lines of red or brown articulated or interrupted with white, encircling the whorls, over a variable clouding of rich or blackish brown, generally with short flammules below the sutures of alternate light and dark; aperture shorter than spire, ovate; margins nearly equally curved.

Alt. 10, diam 6 mill. *Samoan and Viti Is.*

P. WISEMANNI Baird, 1873. Pl. 39, figs. 73, 74.

"Shell small, polished; whorls 5½, apex rather obtuse and blackish; the remaining whorls yellowish with transverse pink bands, the body whorl having seven or eight of these, also marked throughout with brown spiral hair-like lines. Beneath the sutural line there are alternately blackish and white blotches, the latter being produced zigzagly over the whorls; aperture subcircular, equalling the spire in length." Alt. 7 mill.

New Hebrides.

A variety is described with shell of lighter color, only slight indications of pink bands, but with the same subsutural dark and light blotches.

P. VIRGO Angas, 1867. Pl. 39, fig. 93.

"Minute, rather thin, globosely conical, white; whorls 4, the last ventricose, and painted with fine undulating pink lines, darker at sutures, where they are separated by several broad descending white flammules, the lower portion of the last whorl encircled by a row of white spots; columella slightly excavated, white." Alt. 2 mill.

Coodgee Bay, N. S. Wales, Australia.

Sometimes subperforate. The peculiar dentition is figured on Pl. 60, fig. 70.

Genus ALCYNA A. Adams, 1860.

Shell minute, similar in form to Phasianella; aperture ovate; columella with a heavy callus, bearing near the base a strong curved

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denticle projecting into the aperture; outer lip simple. Operculum and animal unknown. Type, *A. ocellata* A. Ad.

Japonic and Pacific Provinces.

A. OCELLATA A. Ad., 1860. Pl. 40, fig. 12.

Shell smooth, imperforate, whorls slightly convex, pale crimson, the last encircled by occellated spots; columella terminating in a prominent acute denticle.

Sea of Japan, off Talen-Sima. Dredged in 25 fms.

A. LEPIDA A. Ad., 1860. *Unfigured.*

Shell smooth, shining, imperforate, pale reddish brown, apex blackish, and encircled with pale blackish lines; whorls 5, rather flat; parietal callus terminating below in a small acute tooth.

Sea of Japan, off Talen-Sima, in 25 fms.

A. RUBRA Pease, 1860. Pl. 40, figs. 6, 7.

"Shell small, ovate, smooth, polished; whorls 4, convexly rounded; aperture ovate; indented at the umbilical region, and grooved; columella with a prominent tooth near the base; color red, of different shades, or painted in a variety of patterns with blotches and spots of red and white, or marked with oblique longitudinal red lines." (*Pease.*) *Hawaiian Is.*

A. LINEATA Pease, 1869. *Unfigured.*

"Shell somewhat elevately turbinate, solid, thick; narrowly perforate, transversely ridged; whorls 4, convex; aperture ovate; lip thickened within; ridges red, interstices whitish; columella and apex white. Alt. 2¼, diam. 1¼ mill." (*Pease.*)

Ins. Oahu.

A. STRIATA Pease, 1869. *Unfigured.*

"Shell elevately turbinate, rather solid, narrowly perforate, transversely impressly striate; whorls 4, angulate beneath the suture; aperture ovate; outer lip slightly thickened within; speckled and mottled with black and gray of different shades, whitish beneath the sutures. Alt. 2, diam. 1¼ mill." (*Pease.*)

Hawaiian Is.

A. SUBANGULATA Pease, 1860. *Unfigured.*

"Shell minute, rather solid, turbinate, ovate, ornamented with raised spiral striæ; whorls 4, depressed somewhat in the center;

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outer lip thickened externally; aperture circular; columella ending in a prominent tooth; color deep red, wtth oblique light red lines." (*Pease.*) *Hawaiian Is.*

Unfigured and unidentified species of Phasianellinæ.

It is scarcely worth while to attempt to identify species of this group without figures or *very good* descriptions. Nevertheless, in order that my readers may have before them all the information that is accessible to me, I here reprint *verbatim* the descriptions of *Phasianellinæ* not noticed in the preceding pages.

EUTROPIA MODESTA Gould, 1862.

"T. parva ovato-conica, glabra, lutescens, fasciis obscuris articulatis et maculis fuscis ad suturas et ad basim ornata; anfr. 6, ventricosis; apertura rotundato-ovata; columella pallida, vix incrassata. Alt. 10, diam. 6 mill." (*Gould.*)

Loo Choo.

P. MELEAGRIS (Beck) Pot. et Mich., 1838.

"Coquille petite, ovale-conique, ventrue, lisse, luisante, brune, marquée de petits points ronds allignés dans tous les sens; ceux de la partie supérieure des tours de la spire sont peu distincts, ce qui fait paraitre la coquille plus blanche; spire composée de quatre tours convexes, les trois premiers simple; columella droite et anguleuse à sou insertion au bord columellaire; *rime* ou fente ombilicale marquée, mais peu profonde." Alt. 9–10, diam. 6–7 mill. (*Potiez et Michaud.*) *Habitat unknown.*

P. MARMORATA Dufo, 1840.

"Têt de petite dimension, ovale, lisse et couvert d'une pellicule très mince et transparente; le dernier tour de spire beaucoup plus grand que le reste; l'ouverture ovale presque circulaire, le bord droit tranchant, la columelle arrondie, lisse et blanche. Les couleurs exterieures sont tonjours marbrées et très variées, ayant a chaque suture des points allongés d'une nuance différente de celles du fond." (*Dufo.*) *Seychelles and Admiralty Is.*

Operculum as usual in the genus.

P. PULCHRA Gray.

"Testa minuta, oblique conica, tenui, pellucida, linea albida opaca et fasciis coccineis ornata; anfractibus valde convexis."

"Alt. 2, diam. 1¼ lines."

Australia.

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The above I have copied from Philippi, who quotes from Gray. I cannot find the original description.

P. FLAVA Anton, 1839.

"Lang conoidisch oval, 6 flache Windungen, die letzte ⅘ des Ganzen, glatte, glänzend, blass isabellgelb, mit dunkelisabellgelben vier-eckigen Flecken; Spindel etwas abgestutzt, weiss; ungenabelt; Mündung lang-oval." Alt. 5, diam. 2½ lines. (*Anton.*)

Habitat unknown.

Subfamily TURBININÆ.

Shell turbinate or trochiform, solid, nacreous within, smooth or sculptured outside; operculum circular or elongated, smooth or rugulose outside. Foot rather short and broad; epipodial line with or without cirrhi. Dentition always according to the formula ∞·5·1·5·∞.

In this subfamily there are three well-marked groups, here considered to rank as genera, of perhaps nearly equal systematic value. The principal characters upon which this division is based are the operculum and the radula. The latter is discussed as fully as my material permits below. The operculum, in the entire group, commences as a multispiral disc, like that of a trochus, upon the outer side of which is deposited a thin calcareous layer by a lobe of the foot which projects partly over it. This arrangement produces an operculum which exhibits all the whorls beneath, but which is only feebly, or not obviously spiral above, from the more or less general distribution of the calcareous matter.

In the genus *Leptothyra* the development does not go beyond the primitive stage. The operculum is multispiral, with a thin, calcareous stratum, slightly more prominent around the outer whorl. In *Turbo* the nucleus is the same; but several more rapidly increasing whorls are added, upon which a much heavier layer of calcareous material, covering the whole surface, is deposited. In *Astralium* a very rapidly enlarging whorl starts from the multispiral nucleus, forming far the greater portion of the operculum, and usually leaving a pit at the starting point.

The radula is broad and generally rather short. Median, lateral and marginal teeth are always present, and the formula is invariably ∞·5·1·5·∞. The central teeth are always more developed than in the *Phasianellinæ*, (in which the central tooth represents the part here called the *body*.) but never have the long serrate cusps so

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frequent in the *Trochidæ*. They are made up of three parts, which are lettered on my plate 61, fig. 12; the *body* of the tooth *d*, which bears the *cusp*, *e*, when any is present; this is usually expanded at the lateral margins into *supporting wings*, *c*, (the "*Stützlamelle*" of Troschel.) Under it lies the *basal plate*, *a*. ("*Basalplatte*" of Troschel.)

Between the body and the basal plate there is frequently an accessory plate, marked *b* in the figure, the function of which is unknown to me.

Genus *Turbo*.

A. Central teeth without cusps.

Turbo, including *Senectus* and *Batillus*. Troschel has figured the radulæ of ten species of this group including, however, only one of typical *Turbo*, *T. petholatus*; and I have examined those of several additional forms. There is but slight variation in the several species, and for detailed descriptions of each the student is referred to Troschel's work. The median tooth consists of a narrow oblong quadrate basal plate, frequently with accessory plates of various forms, to the lower end of which is attached the oval body of the tooth,—a simple plate without cusp, bearing supporting wings at the sides. (pl. 61, fig. 6, *T. radiatus* Gmel.). Frequently the central teeth are asymmetrical in this group. The laterals bear supporting wings at their outer angles, and are various in form, with or without cusps; the inner marginals are very large, with large cusps. (pl. 61, fig. 5, *T. argyrostomus*.)

Callopoma. Median teeth like those of Turbo; laterals with simple cusps, and, except the outer one, supporting wings, giving the body of the tooth a trigonal form. Marginals as in *Senectus*.

Ninella. Very similar to *Callopoma* in character. (See Troschel)

Modelia, *Oxana*. Radula unknown.

B. Central teeth with cusps.

Marmorostoma. In this and the following subgenera the central teeth have decidedly reflected simple cusps. The lateral margins bear supporting wings. Lateral teeth similar, but asymmetrical, the outer one without supporting wing; marginals as in *Senectus*. (*T. porphyrites*. pl. 61, fig. 10.) Additional species are figured by Troschel. *T. smaragdus*, which I include in this group, has similar teeth, except that the basal plate projects above the cusps of median and lateral teeth.

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Sarmaticus. (*T. sarmaticus*, pl. 61, fig. 7.) This form is peculiar in the central teeth; which are composed of three lamellæ overlying each other; the cusp is wide and simple. Laterals with cusps, and basal plates projecting beyond the cusps. Marginals as in *Senectus*.

Prisogaster. (*T. niger*, pl. 61, fig. 9.) Median tooth with a very wide body, and supporting wings, cusp narrowly reflected along the whole upper margin of the tooth; laterals with prominent cusps, their bases denticulate; inner marginals not enlarged as in the preceding groups, but rather narrow, with long simple cusps; outer marginals with long serrate cusps. In the denticulate cusps of the lateral teeth, and the narrow inner marginals this form approaches more closely than any other to *Leptothyra*.

Genus *Astralium*. Astraea Bnt. 1795

A. Central teeth with cusps.

Astralium, s. str. (*A. spinulosum*, pl. 61, fig. 12.) The median tooth has a long basal plate, *a*, upon which an accessory obovate plate, *b* rests; upon this is placed the body, *d*, with "stützlamelle," *c*, and cusp, *e*. The laterals are provided with cusps, and, except the outer two, with supporting wings.

Lithopoma. (*A. tuber*, pl. 61, fig. 8.) Median teeth as in *A. americanum*, but with the basal plate projecting below. Laterals similar, asymmetrical. In *A. cœlatum* the central teeth are nearly as wide at the apex as at the base; cusp equally wide; otherwise similar in essential characters. In *A. americanum* (pl. 60, fig. 71,) the basal plate does not project above the cusp; the tooth is subtriangular, with supporting wings on the sides.

Imperator. The radula is known only by a figure published by Hogg many years ago. The central and lateral teeth bear cusps. The marginals are not especially large toward the inside. No further characters can be made out from the figure.

Guildfordia. Radula unknown.

B. Central teeth without cusps.

Bolma. Troschel has figured the radula of *A. rugosa*. My own preparations show a decidedly different form from his figures; the centrals (pl. 61, fig. 13) have a narrow long basal plate, which is produced above the body of the tooth; the latter is wide, oval, not reflected above; its lower margin is not well-defined in my specimens which are, however, not stained; the laterals are of the usual form and bear cusps. This group does not seem to be more related to

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Turbo than the other subgenera of Astralium; I have no hesitation in placing it in the division of *Astralium* containing species without cusps to the central teeth. Compare Troschel, *Das Gebiss der Schnecken*, t. xxi, f. 1.

Cyclocantha. Troschel has examined the dentition of "*A. rhodostoma.*" His figures show very nearly the same form that I have figured for *A. Americanum*, and especially in the central teeth. I have examined the radula of only one species, *A. plicatospinosum*, and find it of a wholly different form. (Pl. 61, fig. 14.) The median teeth do not have a basal plate projecting above; the body is quadrangular, somewhat the shape of a maltese cross, *without cusp.* The laterals have long cusps with spurs at their bases. I am inclined to believe that Troschel's figure was drawn from a species of the West Indian group of *Astralium*, not the real *Cyclocantha.* In view of the great discrepancy between his results and my own, it is very desirable that additional species of *Cyclocantha* be examined.

Uvanilla. Radula unknown.

Cookia. My knowledge of the radula of this form is derived from a figure and description given by Hutton. Median tooth with a long basal plate and short body, of the general form shown on pl. 61, fig. 11 for *Pomaulax.* It bears no cusp, and has small supporting wings. The first lateral also is much like that shown in *Pomaulax;* the others bear cusps, and, except the outer, have "*stützlamelle.*" Inner marginal very broad, with wide cusp. Cusps of outer marginals simple.

Pomaulax. (pl. 61, fig. 11.) In *A. undosum* I find much the same type of dentition as Hutton has figured for *Cookia.* The median teeth have long basal plates, and a cuspless body, with its lateral margins produced into supporting wings. The inner lateral is quite complex in structure; its upper edge is not reflected, but seems turned upward somewhat; its outer upper angle, *a*, lies *under*, and its supporting wing ("*Stützlamelle*"), *b*, *over* the succeeding lateral tooth. The three following laterals have the same form of body, but their apices bear broad simple cusps; the outer lateral is narrow, with a bidentate cusp. The marginals offer no unusual characters; the inner ones are large, with long cusps denticulate at their bases; the outer ones have serrate margins.

Pachypoma. Median tooth with a narrow basal plate, projecting above a rectangular simple accessory plate, which bears about the middle the oval body, without cusp, but with the sides produced into

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supporting wings. Laterals narrow, with simple cusps and supporting wings, the outer narrower and with bidentate cusp. Inner marginals with very large cusps. (See Troschel.)

Genus *Leptothyra*.

I have examined the dentition of the following species: *L. carpenteri*, (pl. 60, fig. 73,) *L. bacula*, *L. læta*, *L. amussitata*, *L. sangarensis*, (pl. 61, fig. 15) *L. granulosa*. In all of these species the median teeth are oval, wide, with a narrow projection above, and more or less narrowed toward the base; the upper margin is in no case reflected, so that cusp, cutting point or edge, in any usual sense, there is none. In *L. carpenteri* and *L. bacula*, however, there is a ledge or thickening, more or less irregular on its lower margin, extending across the body near its upper margin; but this is not formed by a reflection of that margin, and so cannot be considered as a cusp; in the other species this structure is absent. The lateral margins are produced into supporting wings. The laterals are long, excavated on the inner side for the reception of the supporting wings of the centrals, and with a process, *b*, underlying these supporting wings. Their outer margins are produced into supporting wings like those of the centrals. The cusps are provided with several minute denticles at their outer bases. All of the laterals are of this form, except the outer ones which have no supporting wings. The marginals are armed with long blunt narrow cusps, which are longest on the teeth about the sixth from the inside, and decrease in size in either direction from that point; about the twelfth from the inside their margins begin to become serrate. It will be seen that my results are very different from those obtained by Troschel, who has figured the radula of *L. carpenteri* (under the name of "*L. coccineus* Desh."). I am constrained to believe that, owing probably to some imperfection in his preparation or other cause, he misinterpreted certain structures of these minute radulæ. The characters of the radula lend no support to the opinion expressed by some authors as to the position of this genus in the *Trochidæ;* but it is not very closely allied to any group of the *Turbinidæ*. I am undecided about the nature of the projection from the upper margin of the central tooth of Leptothyra; it may be homologous with the basal plate of the preceding groups; but if so it seems to be united with the body as far as the upper margin of the latter,—a condition which is not found in *Turbo*, etc.

In concluding this review, I wish to direct the attention of conchologists to the desirability of procuring and examining the radulæ

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of those subgenera in which this organ is unknown, in order that their correct systematic position may be confirmed. More especially is it necessary that in the cases of *Cyclocantha* and other groups where the testimony of different observers is considerably at variance, additional species be investigated.

In the following account of the various species, subgenera and genera of this family, I have taken every care to adopt a nomenclature that will prove stable; deviating in many instances from the usage of previous authors upon this family in order to attain this end. Notably is this the case in certain subgenera of *Astralium*, in which the pernicious practice followed by many systematists of selecting what they believe to be a "natural" type for a group, instead of restricting the group to species with the organization of the "historical" type, has led in some instances to the exclusion from a subgenus of the very species designated by the describer of that group as its type! I have quoted polynomial or "historical" synonymy only in cases in which such names have been adopted into general use.

In describing sculpture, I have usually avoided the use of the term "transverse," because there seems to be considerable confusion in the minds of many as to whether such sculpture is transverse to the *whorls* or to the *axis* of the shell. The term "longitudinal" is here used to designate markings parallel to the axis, and "spiral" to denote such as follow the direction of the whorls; in flattened species the former is frequently designated as "radiating," and the latter as "concentric."

The Turbines have an old and extensive literature. Most of the more prominent species were figured by Chemnitz, and before him by Lister, Rumphius, Knorr, and many another quaint old author, whose tomes now stand undisturbed on our library shelves, as perhaps our own will rest a century hence. From these store-houses Linnæus drew freely in his mammoth task of cataloguing all animate nature, fitting the species defined by previous authors into his *Systema* with no other addition than a binomial appellation.

In modern times each of the four principal monographic works have considered this group:

Conchylien Cabinet, monograph by Philippi, 1846–8, 18—.
Conchologia Iconica, Reeve, 1848, 1861.
Coquilles Vivants (Kiener), text by Dr. Fischer, 1873, 1880.
Thesaurus Conchyliorum, Sowerby Jr., 1886.

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In the preparation of the following pages the characteristically careful and reliable work of Dr. Paul Fischer has been of constant assistance to me.

Key to genera and subgenera.

I. Shell turbinate or depressed, convex below, young not spinose; operculum convex outside, usually smooth or granulose, sometimes with concentric ribs, nucleus near the centre.

a. operculum simply convex, smooth or granulose
- shell turbinate, spire exserted . . . . *Turbo, s. s.*
- shell depressed above, produced at base . *Marmorostoma.*

b. operculum with spiral ribs outside
- shell imperforate, turbinate, elevated, solid . *Callopoma.*
- shell imperforate, thin, depressed, granulose . *Modelia.*
- shell imperforate, thin, depressed, smooth . . . *Oeana.*
- shell widely umbilicate, depressed . . . . *Ninella.*

c. operculum formed of club-shaped processes . *Sarmaticus.*

II. Shell turbinate, oval, solid; operculum with submarginal nucleus. . . . . *Prisogaster.*

III. Shell trochiform, flattened above or below, young carinated and spinose; operculum with submarginal or terminal nucleus, generally with ribs outside.

a. shell conic, flat or concave below
- imperforate, periphery rounded, base concave . . *Cookia.*
- imperforate, periphery carinate
  - operculum oblong, *very convex* . . . *Pachypoma.*
  - operculum oval, 2-ribbed outside
    - base flat or concave . . . . . *Uvanilla.*
    - base somewhat convex, spire plicate . . *Lithopoma.*
  - operculum 3-ribbed outside . . . . . *Pomaulax.*
- umbilicate, base concave . . . . . *Imperator.*

b. shell depressed, carinated, conic above, convex below
- polished, granulate, spines not projecting at sutures *Guildfordia.*
- not polished, spines projecting at sutures
  - West Indian species . . . . . *Astralium s. s.*
  - Oriental species . . . . . *Cyclocantha.*

c. shell turbinate, not flat below, periphery not carinate
- operculum with subcentral nucleus . . . . *Bolma.*
- operculum with submarginal nucleus . . . *Lithopoma.*

IV. Shell turbinate or globose, small, solid; operculum multispiral, with subcentral nucleus, concave in the centre outside. *Leptothyra.*

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Genus TURBO Linn., 1758.

Shell turbinate or depressed, imperforate or umbilicate; young not carinated nor spinose; base convex; operculum flat or concave inside, with three or four whorls and subcentral (multispiral) nucleus; outside convex, smooth, tuberculate, or with concentric ribs.

The diversity of forms of both shell and operculum in this genus is very great, and has caused the formation of numerous subgenera. The affinities of the minor groups I have attempted to express in the following table:

Central teeth without cusps,	*Turbo*, *Callopoma*, *Ninella*, *Modelia*, *Ocana*.
Central teeth with cusps, operculum convex, granular,	*Marmorostoma*.
Central teeth with cusps, operculum tuberculose,	*Sarmaticus*.
Central teeth with cusps, operculum with submarginal nucleus,	*Prisogaster*.

Subgenus TURBO *s. str.*

Shell large or moderate in size, turbinate; whorls rounded, smooth or ribbed, spinose or carinated, umbilicate or imperforate; aperture subcircular, more or less produced at base. Operculum circular, with subcentral nucleus; outside convex, granulate or smooth, not spiral nor ribbed.

Indo-Pacific Province.

Synonyms: *Olearia* Klein, *Senectus* Swainson.

Three subdivisions may be distinguished, differing in unimportant characters: *Turbo*, (restricted), shell large, dilated at base, imperforate; whorls smooth or nodulous. *Senectus* (Humph.) Swainson, shell generally perforate; whorls spirally lirate. *Batillus* Schum., shell inflated, imperforate; whorls spinose; operculum with a convex spiral rib outside. The dentition is essentially the same in all.

T. MARMORATUS Linn., 1758. Pl. 41, fig. 23.

Shell large, imperforate, solid, ventricose, as broad as long, green, marbled with white and rich brown; whorls 6–7 flattened or concave above, rounded and bearing two nodose keels below, and a

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stronger nodose carina above; aperture large, pearly within, base produced, columellar region more or less excavated. Alt. 100–200 mill. *Indian Ocean*; *Philippines*; *Seychelles*; *Japan*, etc.

T. regenfussi Phil., not Desh., and *T. olearius* Gmel. are synonyms.

Operculum (Pl. 59, fig, 21) subcircular, somewhat concave within, exterior closely tuberculate, whitish.

T. IMPERIALIS Gmel., 1788. Pl. 43, fig. 53; Pl. 62, fig. 8.

Shell large, globose-conic, ventricose, imperforate, solid, green, irregularly mottled and spirally striped with chestnut, closely irregularly striate with the same color; whorls 6–7 convex, with well marked sutures, and numerous more or less conspicuous revolving furrows; last whorl large, somewhat flattened above; aperture subcircular, pearly white within; outer lip rather thin; columella arched, with a pearly callus, which reappears at the posterior angle; parietal wall nearly devoid of callus, green; base slightly dilated, scarcely produced. Alt. 75–100, diam. 70–90 mill.

Indian Ocean; *China Seas.*

Most specimens have less prominent revolving wrinkles than the figure, and some occur almost smooth. Perhaps Reeve's figure, copied in my fig. 53, is a form of *T. marmoratus*.

Operculum circular, flat inside, with four whorls and subcentral nucleus; outside convex, partly granulose, pale brownish olive.

T. JOURDANI Kiener, 1839. Pl. 49, fig. 53.

Shell large, ovate-conic, solid, imperforate; epidermis castaneous or olive; spire acute; whorls 8, rounded, regularly increasing, the upper ones 1–3-carinate, the lower transversely obsoletely lirate, the last large, ventricose, descending, nearly smooth, or with wide spiral costæ; aperture circular, white within, outer lip thin, columella arcuate, not expanded at base. Alt. 140–210, diam. 110–170 mill. *Australia.*

T. MAGNIFICUS Jonas, 1844. Pl. 40, fig. 13.

Shell ovate-conic, turgid, imperforate, brownish, maculated and marbled with violaceous; whorls 6, rounded, finely transversely striate, the upper ones obscurely angulate in the middle, the last obtuse; spire a little exserted, suture distinct, linear; aperture large, circular, pearly within, opaque at margin; columella cylindrical, callous above. Alt. 63, diam. 60 mill.

Bay of Sechura, Peru, in fourteen fms.

I have not seen this species.

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T. CEPOIDES E. A. Smith, 1880. Pl. 44, fig. 78.

Shell ovate-conic, narrowly but profoundly perforate, pale brown, strigate with green variegated with white; whorls 7, very convex, slightly compressed or sub-excavated above, with conspicuous irregular sub-lamellose incremental striæ and inconspicuous spiral lines and sulci above; aperture almost circular, slightly shorter than the spire, inside pale salmon, pearly. Alt. 80, diam. 70 mill.

Habitat unknown.

This species seems to be most nearly allied to *T. imperialis* and *T. jourdani*. Smith compares it to *T. magnificus* Jonas, and says that it is distinguished from that form by the presence of a deep perforation, the narrow sulcations revolving around the upper part of the whorls, and by the coloration.

T. REGENFUSSI Desh., 1843. Pl. 48, fig. 40.

Shell ovate-conic, thick, imperforate, whorls 5–6, smooth, convex, the last large, dilated, ventricose, angulate above, with a revolving series of more or less prominent tubercles, below rounded; aperture circular, inside pearly; peristome simple, posterior angle with a thick callus, columella arcuate, not produced at base; color vivid green, variegated with spiral series of square alternating white and deep chestnut maculations. Alt. 84, diam. 80 mill.

Indian Ocean.

Operculum as in *T. imperialis*, reddish and granulose without.

I am not at all certain that the figures cited by Deshayes do not represent a form of *T. marmoratus*; they are more produced at the base than the figure given by Fischer (and which I have copied) indicates. It may prove to be a variety of *T. marmoratus*.

T. PETHOLATUS Linn., 1758. Pl. 40, fig. 14.

Shell imperforate, solid, polished, shining, rich brown, variously ornamented with dark bands interrupted with white blotches and narrow stripes; whorls 5, flattened beneath the suture, sometimes carinated above; aperture about half the length of the shell, circular, pearly within; peristome and columella tinged with greenish-yellow, Alt. 50–70 mill.

Red Sea; *Indian Ocean; New Caledonia*; *Philippines, etc.*

Operculum (Pl. 60, fig. 41.) circular, with four whorls and nucleus placed one-third the distance across the face; outside convex, shining, bright green on the center, margins brown on one side, white upon the other, slightly granulose about the edges.

T. militaris Reeve, is a synonym.

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Var. REEVEI Phil. Pl. 40, figs. 15, 16.

Deep or reddish brown, clouded and minutely flecked with white; peristome white; columella with a heavy callus. Differs from the type in the more obscure, marbled color pattern.

Red Sea; *Philippines.*

It is *T. variabilis* Rve. (preoc.)

Var. CALEDONICUS Fischer. Pl. 45, fig. 99.

Rufous-orange, spotted with white, variegated with numerous angular maculations; spiral zones obsolete; form slender, elongated: columella white *New Caledonia.*

(*Senectus.*)

T. CRASSUS Wood, 1856. Pl. 47, fig. 20.

Shell large, ovate-conic, heavy, solid, imperforate; dirty white, or greenish, maculated with angular, alternating blackish or brown and light patches on the broad flat spiral ribs, the interstices narrow, superficial, whitish; whorls 6, convex, more or less prominently shouldered above; ribs obsolete around the axis; aperture white within, over half the length of shell, ovate, angled posteriorly and at position of carina; its margin more or less green tinged, not fluted; columella thickened and effuse at base, callous posteriorly.

Alt. 80, diam. 65 mill. *N. Australia; New Caledonia, etc.*

T. canaliculatus of Kiener, (Pl. 47, fig. 21) and of Reeve (Pl. 42, fig. 45), and *T. psittacinus* Phil.? are synonyms.

Operculum (pl. 59, fig. 32) subcircular, concave internally, with nucleus one-third the distance across face; outside very convex, centre dark-brown, coarsely granulose, lighter toward outer margin and more minutely granulate; margin of increment white.

T. SPARVERIUS Gmelin, 1788. Pl. 47, fig. 26.

Shell ovate-conic, solid, imperforate; dirty white or greenish, maculate or tessellate with dark; whorls 6, convex, rounded, more or less angular around the upper part, with inconspicuous incremental striæ and revolving liræ, which on last whorl are wide and flattened with narrow interstices and are obsolete around the axis; aperture over half the length of shell; white within, oval, angular above and below; peristome scarcely crenulated, frequently greenish; columella with a heavy white callus, dilated and effuse at base. Alt. 80 mill

East Indies.

Operculum (as figured by Gould) green outside.

T. canaliculatus Gmel. is probably this species. It cannot be determined with certainty. It is *T. margaritaceus* of Kiener.

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I am inclined to believe that *T. sparverius* is a variety of *T. crassus*. Both are separated from *T. setosus* and its allies by the obsolescence of the spiral liræ around the axis.

T. SETOSUS Gmel., 1788. Pl. 63, fig. 32.

Shell solid, ovate-pointed, imperforate, whitish, or greenish, maculated with brown and olive; spire conic, acute; whorls 6, convex, striate and spirally lirate, the ridges unequal, wider than the interspaces, frequently with interstitial lirulæ; aperture large, oval, white within; outer lip frequently green-tinged, fluted; columella arcuate, deflexed and dilated at base. Alt. 70–80, diam. 60–70 mill.

South-western Pacific; Poumotus Is., N. Caledonia; Marquesas; Kingsmill Is., Seychelles; Isle of France.

Operculum circular, flat or slightly concave within, with four whorls and subcentral apex; outside convex, brown, coarsely granulose in the middle, paler and more finely granular at margins.

T. granosus Phil. is probably this species. It cannot be positively determined.

Var. PATULUS Phil. Pl. 63, fig. 33.

Shell shorter, thicker with larger mouth, shorter spire and canaliculate sutures. Alt. 84, diam. 75 mill.

T. JOBIENSIS Tapparone-Canefri, 1878. *Unfigured.*

Shell ovate-conic, narrowly umbilicate, solid; spire acute; whorls 6, with irregular incremental striæ, spirally lirate, the liræ unequal; last whorl carinate above, planulate between carina and suture, inflated around the middle; revolving liræ fine, close, minutely granulose; base with larger and irregular liræ; aperture round, smooth, silvery within; peristome crenulated, subangulate above, narrowly margined with lemon yellow and orange; columella arcuate, margined without with reddish orange, effuse at base; color rufous-whitish with vivid wide irregular reddish-chestnut maculations.

Alt. 58. diam. 46 mill.

Ins. Jobi, Bay of Geelvink, N. Guinea.

Operculum flat within, castaneous, with 4 whorls and nucleus one-third the distance across the face; outside very convex, polished and greeenish at centre, minutely granulose and variegated with brown and white at margins.

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T. ARTENSIS Montrouzier, 1860. Pl. 45, figs. 96, 97.

Shell oval or subrhomboidal in outline, ventricose, solid, imperforate, covered with a strong olivaceous epidermis; spire short, acute; sutures subcanaliculate; whorls 5–6, convex, with spiral liræ which are narrower than their interstices, and number 11–12 on the body-whorl, grooves closely radiately lamellar striate, with a central riblet; aperture ovate, angulate above and below, white within; columella flattened, wide, effuse at base. Alt. 65, diam. 60 mill.

Ins Art, New Caledonian Archipelago.

Operculum slightly concave within, castaneous, with 3 whorls, the nucleus situated at one-third the distance across the face; outside white, convex, center obsoletely granulose, outer part obliquely striate.

T. FUNICULOSUS Kiener. Pl. 48, fig. 33.

Shell ovate-ventricose, solid, imperforate; spire short, acute, whorls 5, convex; sutures canaliculate; spirally lirate; body-whorl large with unequal liræ and one or two intermediate lirulæ in the interstices; aperture ovate, silvery within, peristome greenish, somewhat fluted; columella dilated and produced at the base; color chestnut-olive, maculated and tessellated with white. Alt. 48, diam. 49 mill.

Habitat unknown.

I have not seen this form, which Fischer compares with *setosus* and *artensis*. In coloration it is similar to *T. fluctuosus*; and Carpenter has identified it with doubt with that species.

T. JAPONICUS Reeve, 1848. Pl. 44, fig. 81; Pl. 48, fig. 41.

"Shell ovate, imperforated, rather thin, somewhat inflated; whorls smooth, spirally ribbed, ribs sometimes prominent and regular, sometimes rather flattened and very irregular; fawn-yellow, variously stained and blotched with red, interior silvered." (*Reeve.*)

Reeve confounded two forms in his illustrations and diagnosis of this species: One of his figures, (pl. ix, fig. 33*b*. of the Conchologia Iconica) is the young of *T. cornutus* Gmel.; the other, (pl. viii, fig. 33, of the Iconica) precedes this on his plates, and has been recognized by Kiener and by Fischer as the real *T. japonicus*. Under these circumstances I am compelled to place in the synonymy Sowerby's *T. cernicus*, which he founds upon shells which are (*teste* Sowerby, *Thes. Conch.*, p. 197.) identical with Reeve's first figure of *T. japonicus*. According to Sowerby the species is from Mauritius, not Japan. The following is Sowerby's description.

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T. cernicus Sowerby, 1886, (pl. 44, fig. 81,) "Shell ovate conic, solid, subventricose, imperforate, yellowish, longitudinally flammulate with reddish-brown; spire acute, elevated; whorls convex sloping above, minutely obliquely striate, encircled by wide flattened ribs, alternating with smaller; last whorl obtusely angulated above, lightly depressed above the angle, scarcely canaliculate; aperture circular, lip acute, scalloped; columella thick, convex, slightly arcuate and slightly produced at base, longitudinally plicated."

"Operculum very convex outside, green, suffused with bright reddish-brown, conspicuously granulose." Sowerby's figure, copied on my plate, is two-thirds natural size.

Specimens before me *from Mauritius*, of this species, are rather smaller than Reeve's figure; the broad flat ribs, and brown operculum, conspicuously granulose in the middle, are the more prominent characters.

T. SPLENDIDULUS Sowerby, 1886. Pl. 44, fig. 72.

"Shell large, ventricose-conoid, imperforate, orange-brown, white and brown punctate and variegate; spire small, acute, gradate; suture scarcely impressed; whorls about 6½, above concavo-planate, then convex, longitudinally obliquely striate, spirally lirate, the liræ numerous, unequal, about 15 on penultimate whorl, the first (subsutural) prominent, subnodulose, brown and white articulated; base convex, smooth, subobsoletely sulcate, overspread by white and dark brown maculations; umbilical region with a white and orange callus; aperture subample, circular, throat silvery." (*Sowerby.*) *Habitat unknown.*

Described from a single specimen of unknown origin.

T. LÆTUS Philippi, 1848. Pl. 44, fig. 75.

Shell conoid, imperforate, spirally lirate, smooth, pale flesh colored, painted with large radiating ferrugineous maculations; liræ about nine in number on the body-whorl, alternately smaller, the third much elevated forming an angle; liræ of base slightly elevated, white and black maculated; columella surrounded by an orange colored area; aperture sub-circular, silvery within. Alt. 63 mill. *Habitat unknown.*

T. ARGYROSTOMUS Linn., 1758. Pl. 40, fig. 18; Pl. 42, fig. 41; Pl. 46, fig. 8.

Shell large, ovate-pointed, solid, whitish, irregularly maculated with greenish and brown; whorls 6, convex, separated by subcanaliculate sutures, the upper two smooth, the lower spirally lirate and radiately more or less squamose striate, body-whorl with about thirteen liræ, which are generally wider than their interstices, and of which the subcoronal and one or two median ones are more

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prominent; penultimate and last whorl bearing numerous elevated vaulted scales upon the liræ; aperture white or brownish tinted within, about half the length of the shell, round-ovate, angled above, dilated and sub-channelled below; columella thickened, somewhat flattened and grooved below the narrow deeply perforating umbilicus. Alt. 90, diam. 70 mill.

Seychelles; Ins. Réunion; Ins. Annaa, Pacific O.

Operculum (pl. 59, figs. 1, 2, 7,) flat inside with 5 whorls, nucleus situated one-third the distance across the face; outside convex, with coarse obtuse granules, which are largest upon the higher part, nearly surrounded by a marginal series of fine oblique wrinkles; color white, more or less tinged with flesh color upon the outer half, and with a narrow marginal orange line.

The synonymy includes *T. princeps* Phil., *T. lamarckii* Phil., = *Delphinula turbinopsis* Lam.? (see next species) *T. argenteus*, Anton.

A very variable species. I have seen many imperforate and subperforate specimens otherwise typical in character. The liræ are sometimes subequal and nearly smooth; this form is the *T. margaritaceus* of Reeve, Fischer, and other authors. The *margaritaceus* of Linnæus seems to have been intermediate in character between the smooth and spinose forms.

Var. MARGARITACEUS (Linn.) Auct. Pl. 45, fig. 100.

Similar in form to *T. argyrostomus;* liræ nearly or entirely smooth, usually with riblets in the interstices except on the base.

Var. CARDUUS Fischer. Pl. 47, fig. 25.

Differs from *T. argyrostomus* in the more conical form, less dilated body-whorl, and imperforate umbilicus. Alt. 51 mill.

Var. AURANTIUS Kiener. Pl. 48, fig. 30.

Shell imperforate, yellowish fulvous, whorls 6, convex, subcarinate, longitudinally striate and spirally lirate, with unequal liræ, larger on the median portion, and numbering about seven on the penultimate, fifteen on the last whorl; body-whorl with a sub-coronal distantly nodose liration. Alt. 43, diam. 38 mill.

Habitat unknown.

Var. BICOLOR Sowerby, 1886. Pl. 44, fig. 71.

This form seems to me to be a synonym of *T. margaritaceus*. Sowerby says of it: "In the only specimen I have met with of this species, the broad brown oblique rays are very clearly defined upon

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a whitish ground; the longitudinal striæ form minute laminar ridges; the suture is narrowly impressed, not broadly channelled as in *T. foliaceus*."

Habitat unknown.

Var. FERRUGINEUS (Anton) Phil., (1849 ?). Pl. 44, fig. 77.

Shell ovate-conoid, perforate, yellowish, painted with wide ferruginous flammules; last whorl with about fourteen liræ, penultimate with about six, the fourth subnodose, forming a distinct angle.

Alt. 25, diam. 20 mill.

Habitat unknown.

T. TURBINOPSIS Lam., 1819. Pl. 62, fig. 9.

"Shell elongato-ovate, umbilicate, pale flesh-colored, maculate with ferrugineous; whorls rounded, traversed by elevated spiral cinguli, the interstices crispate with lamellar incremental striæ; larger cinguli squamose; aperture subcircular; umbilicus narrow."

Philippine Is. (Philippi.)

It is the *Delphinula turbinopsis* of Lamarck; *T. lamarckii* Phil. is a synonymy.

With the exception of Philippi whose identification is doubtful, no one, in recent times, has seen this form.

T. LAJONKAIRII Desh., 1839. Pl. 49, fig. 42.

Shell large, turbinate, solid, umbilicate, white, sometimes sparsely maculate with chestnut; whorls 6, striate, spirally lirate, bicarinate, the last one and one-half armed with erect long stout tubular spines on the carinæ, ten to twelve in number on the last whorl, usually tinged with green; aperture ovate, pearly white and iridescent within; columella thickened below, deflexed, produced and somewhat channelled, excavated at the conspicuous umbilicus. Alt. 80, diam. 80 mill. *Keeling Id., Indian O.; E. Indies.*

Operculum (pl. 59, fig. 10,) subcircular, inside dark brown, with four whorls and subcentral nucleus; outside convex, coarsely granose, and dark brown in the center, lighter and minutely granulate toward edges, margin sub-striate, with an orange line.

This species is most nearly allied to *T. argyrostomus*, differing in the greater development of spines and the wider umbilicus. The spines first appear as vaulted scales upon the upper carina; only in well grown specimens do they become closed in front into tubes.

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T. CHRYSOSTOMUS Linn., 1758. Pl. 40, fig. 19.

Shell ovate-pointed, subperforate, solid, brownish or white, marbled with chestnut; whorls 6, convex, spirally lirate and longitudinally regularly sublamellose striate, the liræ unequal, numerous, sometimes with a coronal and several median carinæ, bearing vaulted recurved spines; a prominent funicle around the umbilical region; aperture about one-half the length of shell, rotund-oval, golden-orange within, peristome white-edged, undulating, slightly produced at base, columella arched, umbilical region indented, subperforate. Alt. 60–70 mill.

New Caledonia; Philippines; Viti and Samoan Is.

The golden-orange color of the throat, though sometimes rather pale, is diagnostic of this form. Operculum (pl. 59, fig. 4) flat and brown inside with four whorls and subcentral nucleus; outside very convex, smooth and shining, brown or yellowish (or green, *teste*, Fischer) in the middle portion, lighter and obliquely striate toward the outer margin, white and smooth on margin of increment.

T. RADIATUS Gmel., 1788. Pl. 47, fig. 23; pl. 62, fig. 1.

Shell ovate-conic, imperforate, solid, whitish, streaked and maculated with brown or green, the darker color often predominating; spire conic, acute, whorls 5–6, convex, irregularly spirally lirate and finely regularly lamellosely longitudinally striate; subcarinate above, sutures subcanaliculate; last whorl usually biangulate, with a coronal and one or two submedian liræ prominent and armed with more or less numerous vaulted scales or spines; aperture about half the length of shell, pearly white within; lip crenate, slightly produced at base; umbilical region sometimes slightly indented. Alt. 40–50 mill.

Red Sea to Madagascar; Eastward to New Caledonia, Nicobar and Philippine Is., etc.

Operculum (pl. 60, figs. 36, 37) flat inside, with 5 whorls and subcentral nucleus; outside finely tuberculate, cinereous or pale olive.

Under the above specific name I unite a number of nominal species which agree in all essential characters. The more important are *T. speciosus* Kiener, (pl. 47, fig. 24) *T. spinosus* Gmel. et auct., *T. tuberculatus* Kiener, *T. chemnitzianus* Reeve—founded upon the same figure cited by Gmelin for *T. radiatus*—*T. nivosus* Reeve, (pl. 42, figs. 44, 46) *P. tuberculosus* Quoy et Gaim., *T. winteri* Phil. (?) This is not the *T. radiatus* of Reeve nor of Kiener, nor (probably) of Anton.

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T. HISTRIO Reeve, 1848, Pl. 62, fig. 2.

"Shell somewhat globose, swollen, imperforated, sutures of the spire excavately channelled, spirally ridged, ridges very finely laminiferous, squamate, scales strong, erect; snowy-white, broadly rayed with orange-rust color. Interior silvered." (*Reeve.*)

Alt. 45, diam. 40 mill.

Habitat unknown.

I can add nothing to Reeve's description and figure of this species.

T. SPECIOSUS Reeve, 1848. Pl. 62, fig. 14.

"Shell ovate, scarcely umbilicated; spire somewhat raised; whorls rounded, encircled throughout by very beautifully closely scaled ridges; yellowish; ridges here and there bright green; interior silvered." (*Reeve.*)

Australia.

Closely allied to *T. radiatus;* and probably only a variety of that species.

T. FOLIACEUS Philippi, 1846. Pl. 46, fig. 9.

Shell pointed-ovate, solid, umbilicate, greenish, longitudinally flammulate with black; spire conic, pointed; whorls 6, very convex, separated by canaliculate sutures; last whorl with about nine rather separated liræ, the whole surface covered with crowded elevated subfoliaceus radiating lamellæ; aperture round, half the length of shell or less; peristome usually nearly free from body whorl above, fluted; columella excavated at the deep and prominent umbilicus.

Alt. 40, diam, 33 mill.

Torres Straits; Port Essington; Port Darwin, Australia.

Operculum (pl. 59, figs. 11, 12.) with subcentral nucleus; outside green, granulate, wrinkled on outer margin, with a radial sulcus marking the limit of the margin of increment.

The synonymy includes *T. foliaceus* Hombr. et Jacq., *T. laminiferus* Reeve, *T. lamellosus* Phil., and *T. squamosus* Gray.

T. INTERCOSTALIS Menke, 1846. Pl. 45, fig. 98; Pl. 46, fig. 4; pl. 62, fig. 7.

Shell ovate-conic, solid, perforate, green or gray, radiately flammulate with black, green or brown, sometimes unicolored; whorls 6, convex, sometimes subangulate above, with numerous unequal revolving liræ and obsolescent incremental striæ; aperture round, the

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upper angle sometimes separated from body-whorl, and projecting, base rounded, columella excavated at umbilicus. Alt. 40–50 mill.

New Caledonia; Sandwich Is.

Operculum circular, with 5 whorls; outside granulose, green or olivaceous at centre, yellowish at margins.

Sculpture less sharp than in the following form, and color greener.

The synonyms are *T. disjunctus* Anton, *T. concinnus* Phil., and *T. articulatus* Reeve, (pl. 45, fig. 98) *T. elegans* Phil., = *T. radiatus* Rve., (pl. 46, figs. 5, 6) is a form somewhat intermediate between typical *intercostalis* and *ticaonicus* Reeve.

T. TICAONICUS Reeve, 1848. Pl. 47, fig. 22; pl. 43, fig. 51.

Shell ovate-conic, perforate, solid, dirty white or greenish, radiately flammulate above and maculate below with black or brown; whorls 6, convex, slightly flattened below the subcanaliculate sutures, sometimes subcarinate, spirally sculptured with inequal liræ, the intervening furrows sharply squamose with striæ of increment; aperture round, produced into a projecting angle posteriorly and frequently disconnected from the body-whorl, white and pearly within, rounded or slightly produced below; outer lip crenulate, columellar arched, excavated at the narrow umbilicus, which is sometimes subimperforate. Alt. 50–60 mill.

Philippines; New Caledonia; Seychelles; Madagascar; Singapore, etc.

Operculum (pl. 60, fig. 47, 49,) with four whorls and subcentral nucleus; outside very convex, deep green, olive or brownish in the centre, lighter toward the margins, all over except side of increment finely granulose, and with a radial sulcus marking the limit of the margin of increment. The prominent character of the operculum in this species, as well as in *T. foliaceus* etc., is the manner in which the outer layer of calcareus matter overlies the granulose surface below, with an obvious sulcus at their junction. Pl. 60, fig. 38, is the operculum of the form known as *T. tumidulus* Rve.

The following are synonyms: *T. radiatus* Kiener (in part), *T. tumidulus* Reeve. This species is closely related to *T. intercostalis* Mke., but differs in color, in the greater prominence of the ribs, and in the operculum. My description and figure of the operculum of *ticaonicus* are drawn from alcoholic specimens containing the animal. *T. foliaceus* Phil. is also allied, and has similar operculum, but has much more conspicuous incremental lamellæ. The umbilicus is indifferently perforate or closed, sometimes rather wide, and the variation in sculpture is considerable. *T. pulcher* Reeve is separated from this species principally because, according to Sowerby, its operculum is different. I suspect however that he is mistaken in this, and that it will prove to be the same; *pulcher* is the prior name.

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T. PULCHER Reeve, 1842. Pl. 46, fig. 7.

Shell ovate-conic, solid, subimperforate, yellowish fawn color, greenish toward the apex, painted with short blackish waved longitudinal lines; whorls 6–7, not very convex, lirate with numerous irregular ribs, alternately large and small, the interstices scaly; aperture subrotund, pearly white within, peristome crenulate; columella slightly thickened and somewhat produced at base. Alt. 60 mill. *N. Australia.*

Operculum, according to Sowerby, like that of *T. sarmaticus*. This however is highly improbable. I expect to find it like that of *T. ticaonicus* and other allied species of *Senectus*.

T. MOLUCCENSIS Phil., 1846. Pl. 44, fig. 76.

Shell globose-conoid, umbilicate, green, rufous marbled; whorls rounded, the upper ones reddish, spirally lirate, the liræ unequal, slightly elevated, separated by narrow obsoletely crenulated interstices; aperture subcircular, lip within green-margined, obsoletely crenulated. *Ins. Amboina.*

Philippi's description and figure are given.

T. CASTANEUS Gmel., 1788. Pl. 45, figs. 88–90.

Shell ovate-conic, imperforate, solid, orange-colored, brown or gray, sometimes banded, flammulate, or maculated with white; spire conic, acute; suture subcanaliculate; whorls 5–6, convex, ornamented with numerous unequal spiral granose, spinose or squamose liræ, of which the subsutural and three or four submedian are more prominent; aperture white, subcircular, subangular above; peristome slightly produced below; columella with a heavy white callus. Alt. 30, diam. 25 mill.

West Indies; coast of the Gulf of Mexico.

Operculum (Pl. 59, fig. 8,) castaneous within, with four rapidly increasing whorls, nucleus one-third the distance across the face; outside convex, nearly smooth, white, or stained with brown and green around the middle.

T. crenulatus Gmel., *T. virens* Anton, and *T. hippocastanum* Lam. are synonymous.

The typical form is very sharply sculptured, the principal liræ bearing vaulted scales. In *crenulatus* Gmel. the ribs bear less conspicuous tubercles. An abundant and variable species.

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T. QUADRISERIATUS Anton, 1839. Pl. 44, fig. 79.

This form is known to me only by a short description and Philippi's figure, which I have reproduced. I am inclined to believe it a form of *T. castaneus*, although I have seen no specimen of that species approaching very nearly to it. Anton says that it has "4½ bauschige Windungen, letzte mit vier Reihen stumpfer Tuberkeln besetzt, die übrigen bloss quergestreift," etc.

West Indies (Anton.)

T. SQUAMIGER Reeve, 1842. Pl. 49, fig. 43.

Shell globosely ovate, imperforate, suture excavated; whorls 5–6, convex, carinate, the last ventricose, with erect tubercles at the suture, "spirally armed throughout with scales, upper and lower scales much larger; pale green, dotted and variegated with reddish brown, interior silvery." Alt. 27, diam. 26 mill.

W. coast Mexico and Central America: Galapagos.

I have not seen this species. It may perhaps belong in *Callopoma*, but also resembles a very roughly sculptured *T. castaneus*.

T. MOLTKIANUS Gmel., 1788. Pl. 49, figs. 44. 45.

Shell ovate-conic, solid, imperforate; whorls 5, convex, subcarinate above, striate, irregularly lirate and bearing a series of rather elongated radiating tubercles below the suture; shoulder tuberculate, median portion of body-whorl with several less prominent nodose carinæ; aperture oval; columella callous, arched, deflected and somewhat produced below; color whitish with broad revolving bands of dull red. Alt. 40, diam. 35 mill.

West Coast of Mexico.

This is undoubtedly the *cochlea lunaris moltkiana* etc. of Chemnitz, *Turbo moltkianus* Gmelin. I have been on the point of placing this and the next species in *Callopoma*. The resemblance to *T. saxosus* is striking; but it differs in its less sloping shoulder and in the absence of the columellar groove. The operculum is unknown.

T. SUBCASTANEUS Pilsbry, 1888. Pl. 46, figs 10, 11.

Shell ovate-pointed, imperforate, grayish; spire conic, acute; whorls 5, marked with revolving series of tubercles, subangulate and nodulose at shoulder; suture well impressed, with a series of coarse radiating corrugations below it; aperture rounded, slightly exceeding half the length of shell, white within; columella arched, slightly dilated at base. Alt. 23, diam. 19 mill.

Habitat unknown.

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This is the *T. pustulatus* of Reeve, preoc. by Brocchi. I add to Reeve's figure of this species, one drawn from a specimen in the Academy's museum. I have a form of *T. castaneus* which approaches it; and *subcastaneus* may prove to be a variety of that species; an opinion already advanced by Sowerby Jr. The operculum is unknown.

T. CAILLETI Fischer et Bernardi, 1856. Pl. 48, fig. 37.

Shell ovate-conic, perforate, solid, shining; sutures impressed; whorls 5–6, convex, rounded, spirally lirate; last whorl exceeding balance of shell in length, with six prominent spiral liræ and minutely lirate around the umbilicus; aperture ovate, transversely dilated, silvery within; peristome acute; columella white, thickened; color intense orange-red, the liræ punctate with white.

Alt. 27, diam. 23 mill.

Guadaloupe, West Indies.

Operculum convex without, white.

T. FILOSUS Kiener, (18 ?) Pl. 48, fig. 36; pl. 62, fig. 6.

Shell ovate-conic, umbilicate, spire acute, orange colored, or with longitudinal alternating orange and white flames; whorls 5–6; depressed around the upper part, rounded, spirally lirate, the liræ about fifteen on the last whorl, finer beneath, and generally with lirulæ in the interstices about the middle portion; suture impressed, bordered below by a flat tract; aperture oval, white within; columella thickened into an outwardly flaring lip below, and connecting above with a parietal callus which partly covers the umbilicus and is produced in front of the aperture. Alt. 25–26, diam. 23–25 mill.

Habitat unknown.

To Kiener's illustration (fig. 36,) I add that of a specimen with longitudinal flames of color. (fig. 6.)

Operculum (pl. 60, fig. 53,) white outside, and showing an obsolete spiral structure like that of *T. spenglerianus*. With this species it seems to be most nearly allied.

T. STENOGYRUS Fischer, 1873. Pl. 50, fig. 64.

Shell ovate-conic, acute, elongate, imperforate; whorls 6, rounded, transversely lirate, radiate and finely striate; last whorl scarcely exceeding balance of shell in length; suture margined; liræ narrow. below with flat ribs, the interstices and below the suture striate; aperture circular, silvery within, columella regularly arcuate, not

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produced at base; color pale green, with chestnut maculations, the liræ white and brown articulated. Alt. 26, diam. 21 mill.

Ins. Basilan, Philippines.

T. GEMMATUS Reeve, 1848. Pl. 44, figs. 68, 69.

"Shell somewhat depressly ovate, imperforated, sutures of the spire somewhat deeply channelled, whorls beaded throughout with small nodules, light coral red, interior silvered." (*Reeve.*)

Habitat unknown.

I have added Sowerby's figure (69) to the original one of Reeve. I do not know the species.

T. PARVULUS Phil., 1848. Pl. 44, figs. 73, 74.

Shell ovate-conoid, imperforate, with strongly convex whorls, encircled by flat liræ, which are wider than the striate interstices, smooth, the incremental striæ scarcely marking them; aperture subcircular; coloration variable; in one example green predominates, marbled with black and yellowish-white flecks; another is reddish-brown mingled with olive-green, nearly unicolored.

Alt. 20, diam. 17 mill.

Liewkiew Is.

The description and figures are taken from those of Philippi.

T. SEMICOSTATUS Pease, 1860. Pl. 63, fig. 19.

"Shell depressly ovate, finely striated, obliquely and longitudinally; spire and upper part of last whorl ridged, lower half smooth, ridges irregular in size, somewhat angulated at the centre, aperture circular, lip slightly effuse at base, imperforate, color light brownish red, marbled and variegated with darker, and ornamented with a broad yellowish spiral band below the periphery of the last whorl." (*Pease.*) *Ins. Capul.* (*Cuming.*)

I copy the original description of Pease, and the figure given by Sowerby. The species may be a *Leptothyra.*

T. SMITHI Sowerby, 1886. Pl. 44, figs. 64, 65.

Shell ovate-conic, imperforate, yellowish brown, or yellow clouded with orange-brown; spire elevated, acute; whorls 5, sloping above, convex, longitudinally irregularly striate, spirally costate, the costæ rugose, irregular, slightly elevated, about four on penultimate, twelve on body-whorl; aperture circular, peristome simple, columella white.

Ins. Capul. (*Cuming.*)

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This species is known to me only by Sowerby's description and figures.

T. SANDWICENSIS Pease, 1860. *Unfigured.*

Shell ovately turbinated, slightly perforated, somewhat tubulous, spirally ridged;—ridges smooth alternately rather smaller, squamose; scales most prominent on the last whorl, interstices between the ridges finely imbricately laminated; last whorl somewhat angulated at the upper part, color green, marbled and variegated with dark brownish red." (*Pease.*) *Sandwich Is.*

T. TROCHOIDES Reeve, 1848. Pl. 39*a*, fig. 34.

"Shell somewhat pyramidally ovate, perforated; whorls spirally grooved, concave round the upper part, then obsoletely nodose; yellowish-white, radiately blotched with olive and obliquely vermiculated with very minute orange-brown lines." (*Reeve.*)

Habitat unknown.

T. EXQUISITUS Angas, 1877. Pl. 63, figs. 25, 26.

"Shell small, imperforate, solid, pale greenish buff or light pink, painted with very broad descending flames of an orange color on the upper portion of the whorls; whorls 4½, angulated on the periphery, flattened above, the upper whorls encircled below the angle with two and the last whorl with five stout scabrously nodulous ribs; between these and the sutures are four or five smaller and closer ribs of a similar character, and on the base of the last whorl about eight ribs which are less nodulous and scabrous than those above, the interstices being crossed by fine striæ; spire somewhat elevated; aperture nearly circular; columella thickened, terminating in a blunt callosity at the base; pearly within." (*Angas.*) Alt. 12, diam. 9 mill.

Cape Solander, Botany Bay, Australia.

A variety occurs of a brilliant orange-red color throughout.

T. PUSTULATUS Brocchi. Pl. 44, fig. 80.

"This interesting species, which was perfectly defined by Brocchi, is characterized by a trochiform shell extremely solid and thick, ornamented exteriorly by nodulous transverse ribs, slightly elevated and irregular. Its whorls are 5 in number. It is of a dirty green color, except around the aperture where small red points appear. The aperture is round, and has the right lip interiorly furrowed and granulated. The operculum is very convex, and of an ashy color. Alt. 15, diam. 12 mill." *Suez.*

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I do not have access to Brocchi's description of this form. The above is a translation of Issel's note in *Mal. del Mar Rosso*, p. 219. My figure is a copy of that of Savigny, to which Issel refers.

I cannot learn the exact date of Brocchi's paper, "*Catalogo di una serie di conchiglie raccolte presso la costa africana del golfo arabico dal signor G. Forni*," in which this form was described. It was published in a journal entitled *Biblioteca Italiana*, sometime between 1819 and 1823.

T. CUCULLATUS Tenison-Woods, 1878. *Unfigured.*

Shell solidly turbinate, with large irregular scorched patches on a dirty white ground; whorls 4½, spirally closely keeled with small round alternating keels, on the larger of which, about twelve in number, there are small tubercles or small raised hooded scales; the whole shell is obliquely closely imbricately striate; suture impressed; aperture round, entire, and with an outer margin, within which there is a very clearly defined line of silvery nacre which lines the throat; base convex, lirate. Alt. 24, diam. 18 mill.

King's Id., Bass Sts., Tasmania.

The proper position of this *Senectus* is unknown to me.

T. SPENGLERIANUS Gmel., 1788. Pl. 42, fig. 43; pl. 50, fig. 65.

Shell imperforate, large, ovate-conic, white, irregularly maculated and articulated with brown; spire conic, acute; whorls 6–7, rounded, *separated by widely channelled sutures*, the last whorl ventricose, encircled by about seventeen smooth ribs which are as broad or broader than their interstices; aperture ovate, white within, outer lip thin, base rounded; columella with a very broad white callus which is reflexed over the axis from umbilical region downward; parietal wall callous. Alt. 85, diam. 70 mill.

West Indies; Gulf of Mexico.

Operculum (pl. 60, fig. 35) light brown inside, flat, with 3–4 whorls, rapidly increasing, with apex scarcely more than one-fourth the distance across face; outside convex, white, much elevated close to the columellar edge, minutely acutely and sparsely granose, spiral, the beginning of the spiral more roughly asperate, partly covered by a rude callus; outer edge marked by several concentric impressed lines.

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T. HETEROCHEILUS Pilsbry, 1888. Pl. 69, figs. 22, 23.

Shell subimperforate, turbinate-conic, solid, soiled white, above longitudinally flammulate with greenish and brown, base irregularly maculated with the same colors; sculpture consisting of spiral liræ cut into regular close rounded beads; the interstices between the principal liræ occupied by beaded lirulæ, or, on the upper whorls by very close regular small folds, in the direction of incremental lines, the surfaces of which show traces of microscopic impressed spiral lines; the liræ number about 20 on the last whorl; three or four about the peripheral region are more prominent; those of the base are subequal, and less conspicuous; the sculpture also becomes obsolescent toward the termination of the last whorl; spire conic, acute, small; sutures subcanaliculate, with a beaded border; whorls 5½–6, quite convex, rapidly increasing, the last large, convex, slightly descending anteriorly; aperture about half the total altitude of shell, oblique, oval, rounded above and below, silvery within, the outer lip acute, rather thin, regularly arcuate, the columellar callous continued upon the parietal wall, forming a regularly arcuate inner lip; parietal callus dilated upon the body-whorl in front of the aperture; columella rounded, the lip slightly everted, partly covering the umbilical fissure, which is encircled by a spiral ridge terminating at the base of the columella.

Alt. 35, diam. 33 mill.

Habitat unknown.

This handsome *Senectus* is more closely allied to *T. filosus* than to any other known species. The general form and proportions are the same, but the beautifully beaded liræ and especially the almost perfectly oval aperture will separate it from that species. In color, too, the forms are diverse. The parietal callus is not shaped like that of *T. filosus*, nor is the columella below so broadly everted and lipped as in that species. The anterior outline of the callus, from the base to the superior angle of the aperture, is wholly different in the two species. The sculpture and columella will separate this form from *T. spenglerianus*, which, with *heterocheilus* and *filosus* form a group of species, lying on the outskirts of *Senectus*, the more prominent characters of which are found in the peculiar parietal callus and the operculum which exhibits a feebly spiral structure outside.

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(*Batillus.*)

T. CORNUTUS Gmel., 1788. Pl. 43, figs. 50, 52.

Shell large, ventricose, ovate-pointed, imperforate, brown, grayish or greenish, with irregular incremental striæ and spiral liræ; spire conic, acute; sutures deeply impressed; whorls 6, the last one and one-half ventricose, somewhat bicarinate, armed about the middle with two spiral series of erect tubular spines, and frequently a smaller accessory row above; aperture oblique, rounded, white within; lip thin; columella broad, flattened and somewhat grooved, produced and channelled at base. Alt. 95, diam. 95 mill.

Japanese Seas.

Operculum (pl. 60, figs. 33, 34) within brown, concave, with four whorls, nucleus one-third the distance across the face; outside convex, white or tinged with brown and olive, more or less sharply asperate with elevated points, and with a spiral rib commencing in an axial elevation and terminating at the margin of increment.

T. japonicus Reeve, in part, (pl. 43, fig. 52) is synonymous.

The lower series of spines is sometimes absent.

Subgenus CALLOPOMA Gray, 1850.

Shell turbinate, imperforate, dark colored; aperture round; face of the columella with a deep curved longitudinal groove. Operculum circular with subcentral apex; outside convex, granulose, with a deep central pit and a marginal cordon of granulose ribs, separated by narrow, deep concentric grooves.

Californian and Panamic Provinces.

The affinities of this group are with *Ninella* on the one hand and *Senectus* on the other. In the latter group, the opercula of *T. spengleriauus* and *T. cornutus* show some affinity to those of *Callopoma*.

T. FLUCTUOSUS Wood. Pl. 43, figs. 48a, 49; Pl. 50, figs. 54, 55.

Shell ovate-conic, short, solid, imperforate, olivaceous, green, brown or grayish, longitudinally strigate or tessellate with white; spire conic; whorls 5, generally angulate and nodose at shoulder, with a varying number of coarse subnodose revolving carinæ and of intermediate lirulæ upon the median and lower portions of the body-whorl; aperture large, iridescent within; columella wide, white, slightly produced at the base, and with a longitudinal excavation or groove upon its face. Alt. 58, diam. 65 mill.

West Coast of America, from Gulf of California northward.

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The synonyms are *T. fluctuatus* Reeve, *T. moltkianus* Reeve, *T. fokkesi* Jonas, *T. assimilis* (fig. 55) *T. tessellatus*, (fig. 54) and in part *T. saxosus*, of Kiener.

Operculum (pl. 59, fig. 29) rounded oval, with four whorls and subcentral nucleus; outside convex, central portion elevated, white, sharply granulate, bounded by a wide groove which connects with a deep central pit by a lunate channel; outside of this is a zone bearing about six narrow concentric beaded green lirulæ, which are not continuous over the side of increment.

Sometimes most of the sculpture is subobsolete; whorls rounded. The largest specimen I have seen measures alt. 80, diam. 75 mill.

Var. DEPRESSUS Carp. Pl. 43, fig. 48.

Shell much more depressed than the type.

California.

Carpenter cites Reeve's pl. viii, fig. 34 as representing his variety; but that figure is of the common form. Reeve's fig. 3c on pl. ix, is probably what Carpenter intended.

T. SAXOSUS Wood. Pl. 48, figs. 31, 32; Pl. 50, fig. 56; Pl. 57, fig. 50.

Shell ovate-conic, imperforate, brown, olive or gray, above radiately marked, below irregularly maculated with snowy white, sometimes dark, unicolored; spire conic, acute; suture canaliculate; whorls 5–6, lamellosely densely striate and spirally irregularly lirate, carinated, usually more or less nodose at shoulder, and bearing a subsutural series of stout erect tubercles; aperture half the length of shell, rounded, white and iridescent within; columella arched, callous, concave, with a deep semilunar longitudinal groove, slightly produced at base. Alt. 35–50, diam. 30–45 mill.

W. Coast Central America to Galapagos.

T. nitzschii Anton ("*mitzchii* Anton" Sby.), and *T. venustus* Phil. are synonyms.

Operculum (pl. 59, figs. 30, 31) rounded oval, flat and dark chestnut inside, with four or five whorls and subcentral nucleus; outside convex, white, middle portion coarsely granulose, with a deep narrow central pit, bounded by a deep concentric furrow not continuous over the margin of increment, outside of which are three narrow minutely beaded concentric ridges, margin of increment granulose.

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An extremely variable species. Frequently several tuberculate liræ encircle the base; and in this strongly nodose variety the incremental striæ are usually inconspicuous. In another form the spiral liræ are not noticably tuberculate.

T. SHANDI Hutton, 1873. *Unfigured.*

"Shell with three smooth spiral ribs near the periphery, with two or three nodulous ribs both above and below; white, spotted with reddish or purplish brown."

Chatham Is.

The above description, (copied from *Proc. Linn. Soc. N. S. Wales* ix, p. 355) is all the information I can give regarding this species. The copy of Hutton's "Catalogue of Marine Mollusca of New Zealand" to which I have access is without the signature containing his description. The operculum is unknown. Hutton places it with doubt in *Callopoma,* probably not its correct position.

Subgenus NINELLA Gray, 1850.

Shell depressed, widely umbilicate; whorls lirate, sometimes carinate. Operculum oval, nucleus excentric; outside concave in the middle, with two strong spiral ribs, the outer margin thin, granulate.

Australo-Zealandic Province.

T. STAMINEUS Martyn, 1784. Pl. 42, fig. 38; pl. 49, fig. 46.

Shell large, orbiculate, conic, solid, umbilicate, whitish, mottled and strigate with dark brown; whorls 6, with dense lamellose incremental striæ and coarse spiral liræ, the upper ones carinated, the carina becoming obsolete on body-whorl; sutures canaliculate, bordered below by a row of nodules; aperture round, oblique, white within; columella white, perforated by the wide and deep umbilicus, and with a spiral groove extending to the base.

Alt. 60–80, diam. 75–110, mill.

S. Australia; New Ireland; New Zealand.

Operculum (pl. 59, figs. 15, 16) oval, flat within, with four whorls, nucleus situated one-third the distance across the face; outside white, excavated at the center, with two strong spiral ribs, the inner one decidedly the stronger; a sharply granular tract outside the outer rib. The figure given does not well show the character of the ribs.

Synonyms: *T. torquatus* Gmel., "*T. stramineus* Wood" of authors.

This species varies much in degree of elevation and carination. It merges by insensible degrees into the var. *lamellosus.* In the typical form the sutures are frequently simple, not canaliculate, and the subsutural tubercles are wanting.

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Var. LAMELLOSUS Brod. Pl. 43, fig. 54; pl. 49, fig. 47.

Shell more depressed; last whorl strongly carinate at periphery; color light. Alt. 50, diam. 68 mill.

This is *T. heteroclitus* Kiener and var. *sulcata* Reeve.

Subgenus MODELIA Gray, 1840.

Shell depressed, imperforate, granulate all over; "operculum with a convex subcentral granular rib and a sharp-edged submarginal keel."

Australo-Zealandic Province.

T. GRANOSUS Martyn, 1784. Pl. 48, fig. 39.

Shell orbiculate, depressed-conic, imperforate, pinkish yellow, unicolored, or clouded with purplish or brown; whorls 7, rounded, the upper two smooth, the others closely minutely granulose in regular spiral series; last whorl rounded, descending; aperture subcircular, white and iridescent within; columella wide, white, subexcavated in the center, callus thin, shining, rose-tinted.

Alt. 40–64, diam. 50–65 mill.

New Zealand; Chatham Is.

"Operculum ovate, flat within, with 5–6 whorls and subcentral nucleus; outside white, thick, subgibbous, and minutely tuberculate at center, subcanaliculate at periphery."

"*T. rubicundus* Chemnitz" of authors is a synonym.

This species was first figured by Chemnitz in 1781 under the descriptive name of *cochlea lunaris rubicunda granosa* etc. Reeve in his *Conch. Syst.* figures the shell, naming it *T. rubicundus*, and referring to P. Z. S., 1842, for description. His reference has been copied by subsequent authors, but curiously enough, the species is not even mentioned in the "Proceedings," for 1842 or any other year. Martyn's figure is excellent, and being the first publication of the species under a binominal name, has been here adopted.

T. GUTTATA A. Ad., 1863. Pl. 63, fig. 39.

Shell turbinate-conic, umbilicus covered by callus, spire elevated; flesh-colored, gold-tinted, punctate with reddish; sutures canaliculate, deep; whorls convex, cingulate with rows of bead-like separated granules, interstices longitudinally obliquely striate, at the suture ornamented with a series of squamiform tubercles; aperture circular, sulcate within, a thin wide callus covering the umbilicus.

Tatiyama, Japan.

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Subgenus OCANA Adams, 1861.

"Shell turbinate, solid, smooth; axis imperforate; spire short, conical; aperture subcircular, wider than long, inner lip flattened, excavated, scarcely produced anteriorly, with an extended thin callus. Operculum with a convex granular spiral rib, axis deeply perforated, outer lip simple."

South African Province.

T. CIDARIS Gmel., 1788. Pl. 50, figs, 62, 63; pl. 56, fig. 81.

Shell depressed, heliciform, imperforate, smooth and polished; reddish, brown or yellow, usually flammulate above, variously marked below, with white; spire short, whorls 5–6, the upper ones bicarinate, the last often considerably descending, rounded; aperture circular, oblique, white within, rounded below; columella wide, callous, excavated at the umbilical region. Alt. 25–40, diam. 33–48 mill.

South African Coasts.

Operculum slightly concave inside, with six whorls and subcentral apex; outside sharply granulate, white, convex, spiral, with a central pit.

I have not had an opportunity to examine either animal or operculum of this species.

T. CIRCULARIS Reeve, 1848. Pl. 41, fig. 24.

Shell orbicular, conoid, imperforate, pale flesh-color, maculated with bright rufous; apex acute; whorls convex, spirally sculptured with granulose lirae; aperture circular, columella wide, callous, slightly dilated, bounded outside by a spiral funicle.

Alt. 32, diam. 34 mill.

Adelaide, and St. Vincents Gulf, S. Australia.

T. gruneri Phil. (pl. 56, fig. 82) is a synonym.

There is some uncertainty about which of the above names has priority for this species. The volume of the *Conchylien Cabinet* in which Philippi's description occurs, bears date of 1846; but it was not completed until after the publication of Reeve's monograph of *Turbo* in the *Iconica*. Philippi begins to cite Reeve in his synonymy on p. 69 of his work, so that from that point onward we may be certain that his work appeared subsequent to Reeve's; but whether his description of *T. gruneri* (p. 52 of the *Conch. Cab.*) was *actually published* before Reeve's description I am unable to decide. Brazier

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(Trans. Roy. Soc. S. Australia, ix, p. 125) gives priority to *gruneri*, "Philippi in *Zeitschrift für Malak.*, p. 98." The species was never published in the *Zeitschrift*.

The operculum is unknown to me; the species may perhaps be found to group elsewhere.

Subgenus MARMOROSTOMA Swainson, 1840.

Shell depressed-turbinate, very solid, deeply and widely umbilicate (except in *T. coronatus*), smooth, lirate or nodulose; spire depressed, of few whorls; aperture round, produced but not channelled at base. Operculum circular, nucleus subcentral, outside convex, smooth or granulose.

Australo- Zealandic Province.

T. PORPHYRITES Martyn, 1784. Pl. 50, fig. 58.

Shell depressed-turbinate, solid, umbilicate, greenish or blackish, irregularly marked with maculations and angular patches or with spiral bands of white and dark; spire depressed, obtuse; whorls 5, the upper ones frequently carinate; suture subcanaliculate, or often scarcely at all impressed, sometimes bordered below by a series of obsolescent undulations; upper whorls spirally striate or granulate, the sculpture becoming obsolete on last whorl but sometimes reappearing around the base; last whorl somewhat descending, large: aperture oval, angulate above and below, white and iridescent within, frequently margined with greenish; parietal wall frequently excavated or callous; broad, somewhat flattened below the deep narrow umbilicus, dilated and produced or rostrate at base.

Alt. 35, diam. 40 mill.

Indian O.; Philippines; New Caledonia; Solomon Is.; Australia, etc.

Operculum (pl. 60, fig. 49) inside flat, with five whorls and subcentral nucleus; outside very convex, white, the outer part green, obsoletely granulose, nearly smooth.

This is *T. versicolor*, *mespilus*, *ludus* and *porphyrites* Gmel. *T. lugubris* Kiener (Pl. 50, fig. 57). *T. versicolor* Rve. (pl. 42, fig. 39,) is somewhat intermediate between *porphyrites* and *porcatus*.

T. mespilus is said by Fischer to be thinner, more uniform in color, more rostrate at base, last whorl more descending; but all the characters are so variable that I cannot draw the line between the several forms.

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Var. PORCATUS Rve. 1848. Pl. 48, fig. 34.

Shell depressed-globose, solid, umbilicate; spire obtuse; suture slightly undulating; whorls 5, spirally lirate, and with lirulæ in the interstices; aperture, color and operculum as in *T. porphyrites*.

N. Australia; New Ireland.

Separated from *T. porphyrites* by the strong spiral sculpture.

T. UNDULATUS Martyn, 1784. Pl. 42, fig. 40.

Shell depressed-globose, solid, umbilicate, bright green, longitudinally strigate with white under a brown epidermis; spire dome-shaped, or low-conic, obtuse; whorls 5, the upper ones sometimes angulate, spirally lirate, the liræ wider than their interstices, on the body-whorl often subobsolete; last whorl descending, somewhat concave below the suture; aperture oval, white within; columella with a very wide white flattened callus which extends over the umbilical tract; umbilicus wide and deep.

Alt. 35–58, diam. 40–63 mill.

New Zealand; Australia.

Sometimes unicolored green, or with the white strigations broken into tessellations. Reeve's figure which I have copied is more depressed than most specimens.

Var. SIMSONI Tenison-Woods, 1876. *Unfigured.*

Separated from *T. undulatus* by the smaller size, the numerous red and black radiating flammules and the peculiar raised carina on the upper side of the last whorl, continuing around the suture in a kind of hem. Alt. 9, diam. 12 mill.

Georges Bay Head and Blackman's Bay, Tasmania.

T. CORONATUS Gmel., 1788. Pl. 50, figs. 59–61.

Shell depressed-turbinate, diamater greater than the altitude, solid imperforate, covered with irregular spiral series of nodules and granules, of which the subsutural series and two on the median portion of body-whorl are more prominent; spire depressed, dome-shaped, apex frequently eroded and red; whorls 4–5, the last very large; aperture large, round, iridescent within; columella wide, flattened and excavated, deflexed recurved and somewhat chanelled at base.

Alt. 40, diam. 50 mill.

Indian Ocean; Japanese and Chinese Seas.

Operculum inside flat, greenish and golden, iridescent, with about 5–6 whorls and subcentral nucleus; outside convex, greenish, sparcely granulate all over.

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T. lugubris Reeve, *T. hemprichi* Troschel, *T. creniferus*, Kiener and *T. ducalis* Phil. are synonyms.

Usually smaller than the dimensions above given. The figures illustrate the wide variation to which this species is subject. The passage from the strongly tuberculate forms into those in which the transverse striæ simply cut the liræ into diamonds or granules is made by imperceptible degrees.

Var. GRANULATUS Gmel., 1788. Pl. 46, fig. 18.

Shell typically more elongated than *T. coronatus*, altitude about equalling the diameter; umbilicate, finely granulose all over, with subsutural and coronal series of tubercles, and sometimes one or two additional series upon the median part of body-whorl.

Indian O.; Chinese Seas, etc.

T. granulosus (Kiener) Sby., *T. modestus* Phil., are synonyms.

Var. COREENSIS Recluz. Pl. 47, fig. 19.

Similar in sculpture to var. *granulatus*, but imperforate.

Alt. 19, diam. 22 mill.

Corea; Japan.

T. SMARAGDUS Martyn, 1784. Pl. 62, fig. 13.

Shell depressed, heliciform, imperforate, solid, covered with a strong blackish cuticle, beneath which it is green; usually eroded at apex; whorls 4–5, upper ones spirally sulcate or carinate, the last large, flattened above, with incremental wrinkles and subobsolete spiral sulci; aperture large, oblique, rounded, pearly white within; outer lip thin, black-edged, columella arched, with a pearly callus; umbilico-parietal area excavated, concave, white.

Alt. 40–50, diam. 50–60 mill.

New Zealand; Fiji Is.

Operculum (pl. 59, fig. 3,) flat inside with four whorls, the nucleus more than one-third the distance across the face; outside deep green except on the side of increment which is white; very minutely remotely granose; according tb Hutton, smooth.

It is *T. helicinus* Born, 1780. This name has precedence over Martyn's; but I doubt the expediency of changing the well-known name at this late day. I am not sure that the species belongs in *Marmorostoma*, but it certainly should not be placed in *Turbo ss.* as is usually done.

Var. TRICOSTATUS Hutton, 1884. *Unfigured.*

Body-whorl with three spiral ribs.

Wellington to Dunedin, N. Zealand.

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Subgenus SARMATICUS Gray, 1840.

Shell depressed, ventricose, imperforate, smooth or nodulous; aperture oblique, large, columella wide. Operculum composed outside of a dense tuft of club-shaped processes; inside flat, with subcentral nucleus.

South African Province.

Cidaris Swainson, 1840, (not of Klein nor Bolt.) is a synonym.

T. SARMATICUS Linn., 1758. Pl. 40, fig. 17.

Shell globose-depressed, imperforate, dull brownish, above flammulate, below more or less banded or maculate with white, usually showing more or less of the underlying orange-red layer, between which and the nacre there is a stratum of intense black; spire very short, conic; whorls 5–6, convex, the upper ones with revolving liræ, frequently carinated, the last traversed by several rows of nodules, of which the coronal is the more prominent and constant, concave above; aperture large, very oblique, beautifully nacreous within, orbicular; outer lip thin, margined with intense black within, nacre not extending to the edge; columella arcuate, wide, slightly produced below, broadly excavated above; parietal wall eroded, showing a black blotch. Alt. 60–100, diam. 70–120 mill.

Cape Region of S. Africa.

Operculum (pl. 59, figs. 13, 14) flat within, with 5–6 whorls and submedian nucleus; outside convex, whitish, composed of a dense tuft of club-shaped profoundly separated agglomerated processes.

S. classarius Gray is synonymous.

This species, the "Turk's Cap" of the shell dealers, is extremely abundant at the Cape.

T. NATALENSIS Krauss, (January) 1848. Pl. 56, figs. 83, 84.

Shell orbicular depressed, imperforate, olivaceous or brownish, radiately maculate above, irregularly below, with rufous and whitish; spire depressed-conic, obtuse, apex crimson, whorls 5–6, convex, compressed below the sutures, spirally coarsely lirate, the last whorl with about twelve rather widely separated ribs; aperture subcircular, oblique, pearly within, outer lip thin, columella more or less tinged with yellow or green, concave, broad above, with a deep curved pit in the place of the umbilicus.

Alt. 20–30, diam. 25–40 mill.

Natal.

Operculum like that of *T. sarmaticus*.

T. natalensis Reeve (Jan.) 1848, is a synonym.

Fischer mentions a uniform orange variety.

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Subgenus PRISOGASTER Mörch, 1850.

Shell very solid, ovate or subglobular, dark colored, imperforate; aperture large, oblique; Operculum inside yellow, subconcave, with submarginal, basal nucleus; outside very convex.

Peruvian Province.

Amyxa Troschel, 1852, is a synonym.

T. NIGER Gray, 1839. Pl. 42, fig. 42.

Shell ovate, very solid, imperforate, deep dull purplish or bluish black; spire short, convex, blunt; whorls 5–6, somewhat flattened below the sutures, with superficial spiral liræ, and marked with light incremental striæ; aperture large, very oblique, ovate, silvery inside, rounded below; outer lip slightly fluted within; columella wide, white, bearing on its face a longitudinal rib which rises in the region of the umbilicus; parietal wall eroded, white, smooth, or with three white transverse rugæ. Alt. 25–27, diam. 25–30 mill.

Coasts of Chili and Peru.

Amyxa nigra Troschel and possibly *T. lugubris* King, (1831), are synonymous.

Operculum oval, concave within, buff, with 2–3 very rapidly increasing whorls, nucleus one-fourth the distance across the face from basal margin; outside white, very convex, obsoletely rugose. (pl. 69, figs. 32, 33.)

The animal has four lateral filaments upon the epipodial line on either side.

An example of which Fischer gives measurements is larger than any I have seen. Alt. 38, diam. 35 mill.

T. ELEVATUS Souleyet, 184 . Pl. 46, figs. 12–14; pl. 55, fig. 73.

Shell ovate-conic, imperforate, ashy-black, spire acute, elevated; whorls 5, convex, slightly excavated at sutures, nearly smooth, obsoletely spirally lirate; last whorl large, convex below; aperture ovate, silvery within; lip black; columella planate, depressed-concave, not produced at base. Alt. 13, diam. 12 mill.

Coast of Chili.

Operculum yellowish inside, ovate, with two to three whorls and sublateral nucleus; outside convex, white, rugose, subumbilicate.

T. propinquus Hupé (pl. 55, fig. 73,) is a synonym.

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Genus ~~ASTRALIUM Link~~, ~~1807~~.

Shell trochiform, generally more or less flattened above or below; imperforate or umbilicate; *young specimens always carinated and spinose* at the periphery; operculum oval or oblong, with (except in *Bolma*) submarginal or terminal multispiral nucleus; the last whorl forming far the greater portion of the operculum, usually with one or several ribs exteriorly, following the course of the spiral and most elevated at the distal extremity.

The synonyms are *Calcar* (Montf.) Fischer and other authors, *Imperator* (Montf.) Auct., *Trochus*, in part, of all earlier authors, and *Turbo*, in part, Sowerby Jr. and others.

Authors have been considerably at variance in regard to both the limits and the proper designation of this genus. I have examined the history of every name proposed for species of the group, either as generic or subgeneric, and find that none prior in date to that of Link (1807) are entitled to any standing in nomenclature.

I am indebted to Dr. W. H. Dall for a copy of Link's description of *Astralium*. It was defined in the *Beschreibung der Naturlien-Sammlung der Universität zu Rostock, von D. H. F. Link, Professor*, etc., p. 134–135, May 17, 1807; the genus is briefly described by Link and *A. deplanatum* given as the first species, with a reference to figures in Chemnitz, which fix the identity of *deplanatum* with Lamarck's *A. costulatum*, a species of the West Indian group.

Those species having a turbinate form, convex base and rounded periphery, such as *A. rugosum*, *A. calatum*, *A. tuber*, have been frequently adduced by authors as supplying the connecting links between *Turbo* and *Astralium;* but such resemblance as they have to *Turbo* is to be attributed not to any real relationship, but to a secondary modification which they have undergone from the stellate forms of *Astralium*. That this is the case is shown by the young of the turbinate species, which we find to be flattened, acutely carinated and spinose, precisely as in typical *Astralium*. As a rule, the young of species of this genus are depressed, carinated and spinose at the periphery, the spines frequently being reduced in size or lost in the adult; whilst in *Turbo* the young are in the spinose species smoother than the adult, the spines becoming always more prominent with age.

The real connecting forms between these genera the student must look to palæontology to supply; for the recent species which at first seem to be intermediate in characters are undoubtedly descending from stellate types of *Astralium*.

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Like *Turbo*, this genus is composed of a number of quite diverse subgenera of various degrees of affinity to each other. I am inclined to divide them first into two series: those with the central teeth of the radula composed of several plates overlying each other, and without a reflected cusp at the superior margin, and those with a reflected cusp above. The natural sequence and affinities of the subgenera are shown in the following table:

Central teeth of radula with cusps.	Astralium, s.s. Lithopoma. Imperator. Guildfordia.
Central teeth of radula without cusps.	Bolma. Cyclocantha. Uvanilla. Cookia. Pomaulax. Pachypoma.

Subgenus ASTRALIUM, Link, *s. str.*

Shell conical, elevated or depressed, narrowly umbilicate or imperforate, carinate at the periphery, base planulate or convex, whorls above flattened or concave, costate or tuberculate; operculum oval, outside smooth or nearly so, very convex, excavated near the center. *West Indian Province.*

Calcar Schum., 1817, is a synonym.

A. LONGISPINA Lam., 1822. Pl. 51, figs. 1–9.

Shell depressed conic or lens-shaped, umbilicate or imperforate; white, yellowish or light brown; *apex obtuse;* whorls 5–6, acutely carinated at periphery, concavely flattened above, obliquely plicate or spirally lirate, the liræ bearing tubercles or squamose processes; periphery armed with recurved triangular obliquely wrinkled spines, usually thirteen to eighteen in number on the last whorl, and more or less projecting at the sutures; base gently convex, densely lamellose radiately striate, and with about four concentric subnodose liræ; aperture transversely ovate, angled and canaliculate at termination of carina; columella short, curved, somewhat dilated over the slightly indented umbilical tract; umbilicus generally very narrow or not perforated. Alt. 30, diam. 65 mill.

Entire West Indies; Bahamas; Bermuda; Tortugas (Simpson); *Guatemala.*

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Operculum (pl. 60, figs. 57, 58) oval, nucleus sublateral; outside white or slightly brownish, very convex, nearly smooth, excavated near the center.

Trochus orichalceus (figs. 8, 9) *T. aster*, and *T. heliacus* Phil., *T. planus* (Gm.) Phil., *Astralium deplanatum* Link and perhaps *T. inermis* Gmel. are synonymous.

An abundant and variable species. Figs. 1, 2, represent the typical form. The following variety has typically a very distinct aspect; but I am unable to separate it specifically by constant or well marked characters.

Var. SPINULOSUM, Lam., 1822. Pl. 51, figs. 4–6.

Shell conically elevated, imperforate; whorls flattened above, radiately costulate or spirally lirate, or both, and tuberculate or squamose; peripheral carina generally subspinose or nodose; concentric liræ on the base three to six in number, the inner generally nodose. Two specimens measure as follows:

Alt. 32, diam. 61 mill; alt. 38, diam. 45 mill.

W. Indies; Florida.

Fig. 6 is drawn from a specimen from Key West, Florida, collected by Hemphill. Lamark's *T. costulatus* (pl. 51, fig. 7), is in form intermediate between typical *longispina* and var. *spinulosum;* it is umbilicate and obliquely plicate above. I cannot tell what species Reeve figured as *T. spinulosus;* it seems to be a very depressed form of *A. petrosum* Mart. It is certainly not the *spinulosum* of Lamarck.

A. ARMATUM Phil., 1848. Pl. 51, figs. 10, 11.

Shell conic, *apex acute;* sculpture as in var. *spinulosum.*

Alt. 16, diam. 27 mill.

Antilles (Philippi); *St. Croix.*

A single specimen of this form I found in a suite of *A. longispina* from St. Croix. From that species it differs in the conical acute apex.

A. BREVISPINA Lam., 1822. Pl. 52, figs. 12, 13.

Shell conic, imperforate, solid; whorls 6–7, flat above, obliquely costate below the sutures, then with several revolving series of granules; periphery sharply carinate, armed with short triangular spines which festoon the sutures and project more or less, about 10–13 in number on the last whorl; base a little rounded, radiately lamellose striate and concentrically lirate, the liræ three to five in number, mostly tuberculate, especially in the young; aperture transverse, oval, channelled at outer angle; columella short, arched; place of

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the umbilicus excavated, whitish, bounded by an intensely orange-vermillion tract. Alt. 28, diam. 40 mill.

West Indies; Florida Keys (Simpson); *Costa Rica; Venezuela.*

T. aurispigmentum Jonas is synonymous.

It is frequently larger than I have indicated.

A. LATISPINA Phil., 1844. Pl. 63, figs. 21, 22.

Shell imperforate, conic, greenish, brown maculated; whorls 7, subplanate, obliquely costulate below the sutures, then with two beaded spiral lirae; margins of whorls exserted, expanded, compressed, armed with triangular spines; last whorl sharply carinate; base radiately lamellose and ornamented with three or four granose concentric costæ; umbilical area depressed, pale greenish or yellowish, aperture oblique, angulate. Alt. 35, diam. 50 mill.

Gulf of Mexico to Rio Janeiro.

Operculum oval, outside white, smooth, with a single arcuate wide rib; inside flat, chestnut colored, nucleus submarginal.

T. buschi Kiener, and *T. tentorium* Anton are synonyms.

This form I have not satisfactorily identified with any shells I have seen. It seems to be closely allied to the preceding species.

Subgenus LITHOPOMA Gray, 1850.

Shell turbinate or trochiform, elevated, imperforate, periphery carinated or rounded, whorls above radiately plicate; operculum oval, outside coarsely granulose, and either simply convex or with a curved spiral rib with its terminations connected by a straight one; nucleus submarginal. *West Indian Province.*

A. Turbinate species with rounded periphery.

A. TUBER Linn., 1767. Pl. 56, figs. 79, 80.

Shell turbinate-conic, imperforate, very solid, dirty white or pale green, radiately maculated with brown above, irregularly marked and lighter below; whorls 6, upper two smooth by erosion, the following obliquely coarsely plicate and finely wrinkled in the same direction above, somewhat shouldered, obtusely angular near periphery, above which several obscure beaded lirae revolve, shagreened by intersection of incremental striæ and oblique wrinkles; base nearly smooth; aperture very oblique, oval, silvery within; columella short, wide, generally bituberculate at the base, excavated over the location of the umbilicus. Alt. 45, diam. 50 mill.

West Indian Province; Florida

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Operculum (pl. 60, figs. 42, 43) oval, nucleus submarginal; outside white, excavated around the upper edge, with a heavy coarsely granulose rib following the central part of the spiral, its ends connected by a short rib.

The young are subspinose at the periphery; adults generally lose the more minute suface-sculpture described above.

A. CÆLATUM Gmel., 1788. Pl. 57, figs. 45, 46.

Shell conic, solid, imperforate, soiled white, more or less tinged with green and brown; spire elevated, apex acute; whorls 6–7, convex, with fine incremental striæ and oblique radiating folds above; periphery with several prominent squamose or spinose liræ; base somewhat flattened, with close squamose liræ separated by deep interstices; aperture silvery within, transversely ovate, very oblique, its margins fluted; columella extended, oblique, arcuate. Alt. 80, diam. 80 mill.

West Indies; Bahamas, etc.

Operculum (pl. 60, fig. 44) oval, nucleus submarginal; outside convex, white or brown tinted, coarsely granulose.

This is the *Trochus caelatus* etc. of Chemnitz, *T. cælatus* Chemnitz of authors.

B. Conic species, with carinated periphery and flattened base.

In this section of *Lithopoma* the species are very variable, and it is difficult to find characters salient enough to satisfactorily separate several of them. Much more material than I have before me must be studied before the synonymy and limits of the various forms can be settled.

A. AMERICANUM Gmel., 1788. Pl. 52, figs. 18–20.

Shell trochiform, elevated, imperforate, solid, white or yellowish; whorls 7, the upper three smooth in adults by erosion of the sculpture, flattened or concave on their upper surfaces, longitudinally obliquely plicate, the folds numbering about thirty-six on the last whorl, terminating on the periphery in nodules (or spines in the young,) generally intersected about the middle by two to four spiral impressed lines, periphery angled, more or less swollen; base nearly flat, more or less sharply radiately striate, and spirally lirate, the liræ about six in number, or sometimes more, frequently nodulose; aperture very oblique; outer lip usually crenulated; columella short, heavy, bituberculate at base, bounded by a radiately plicate cordon. Alt. 35, diam. 30–35 mill.

West Indies; Florida Keys.

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Operculum (pl. 60, fig. 45) oval, light brown within, with sublateral nucleus; outside convex, white, granulose, more or less excavated around the upper margin, excavated near the center; young with a stout curved central rib following the spiral, its ends connected by a short straight rib.

A. CUBANUM Phil., 1848. Pl. 56, figs. 77, 78.

Shell elevated-conic, imperforate, solid, whitish or pale yellow; whorls 7, upper two smooth by erosion, sutures moderately impressed; whorls flattened above, longitudinally coarsely plicate, nodulous on the periphery, the folds about twenty-two to twenty-eight in number on the last whorl, cut about the middle by a few spiral impressed lines; base slightly convex, concentrically lirate, and radiately densely striate, the liræ about six in number, sometimes nodose; aperture wide, subtrapezoidal; columella arcuate, grooved slightly at position of umbilicus, bituberculate at base, surrounded by a radiately plicate cordon. Alt. 38, diam. 35 mill.

West Indies; Tortugas (Simpson).

Operculum (pl. 60, fig. 48) with a strong central spiral granular rib, with its terminations joined by a short riblet, the interval between them deeply excavated.

Allied to *A. americanum*, but separated by the more decidedly granulate and ribbed operculum, which resembles closely that of *A. olfersii*. The peripheral nodes are less numerous than in *A. americanum*, and more numerous than in *A. olfersii*.

A. PAPILLATUM Potiez et Michaud, 1838. Pl. 52, figs. 14–17.

Shell conic, elevated, imperforate, solid greenish-olivaceous, obscurely banded, spire acute; whorls 7, nearly flat, slightly excavated in the middle, finely obliquely striate and radiately costate, folds white, oblique, slightly prominent above, at the periphery tuberculose; last whorl carinated, with about fourteen short tubercles on the carina; base a little convex, radiately striate, with five concentric subnodose liræ separated by very shallow grooves; aperture transverse; columella arcuate, bituberculate at the base; umbilical tract bounded by a plicate cordon. Alt. 25, diam. 29 mill.

West Indies.

Operculum nearly like that of *A. cubanum*.

Figs. 16, 17 are from the original ones of Potiez and Michaud.

The species is nearly allied to *A. cubanum*, perhaps identical.

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A. GUADALOUPENSE Crosse, 1865. Pl. 53, figs. 43–45.

Shell imperforate, solid, elevated-conic, longitudinally subobliquely wrinkled, reddish orange, marked in places with white and olivaceous; suture impressed, irregular; whorls 6½, subplanulate above, slightly concave in the middle, the apical one or two smooth, the following longitudinally plicate, the folds cut in the middle by two impressed spiral lines, projecting at the carinated periphery, and about twenty-three in number on the body-whorl; base nearly flat with radiating striæ and five subgranose liræ; aperture oblique, rhomboidal, columella white, arcuate, bidentate at base, umbilical tract pale violaceous, bounded by a plicate cordon.

Alt. 23½, diam. 25 mill.

Guadaloupe, West Indies.

Operculum outside convex, with a median rib, minutely granulose, excavated near the middle.

It is closely allied to *A. papillatum* P. & M., but may be separated by the flatter base and perhaps the number of the basal liræ. Compare also *A. cubanum*. In the only specimen of this species I have seen (fig. 45) the peripheral tubercles number twenty on the body-whorl. I believe that this species will be found to be a form of *A. cubanum* or *A. papillatum*.

A. OLFERSI Troschel, (18 ?). Pl. 57, figs. 47–49.

Shell imperforate, solid, conic, gray, olive-green and reddish brown; longitudinally plicate, the folds about thirteen in number on the last whorl; periphery nodulose; base slightly convex, with four concentric liræ; aperture subtrapezoidal, white; columella arcuate, bituberculate at the base. Alt. 45, diam. 52 mill.

Brazil (Philippi); *Bahia* (Cléry).

Figs. 48, 49 are drawn from the original ones. I have seen no specimen corresponding with them. The variety figured by Kiener (pl. 57, fig. 47) scarcely looks the same to me. It differs in the "less oblique and more numerous longitudinal folds, which are more interrupted about the middle and more nodulose above." A specimen of this variety before me is marked "*West Indies*."

Operculum (pl. 59, figs. 22, 23) oval, granulose outside, strongly ribbed.

T. saxosus Phil., is a synonym.

A. IMBRICATUM Gmel., 1788. Pl. 55, fig. 70.

Shell conic, solid, imperforate, cinereous or light brownish; whorls 7, planulate above, very obliquely striate, and longitudinally plicate,

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the folds generally eighteen to twenty in number on the last whorl, sub-interrupted or excavated about the middle, produced at the sharply carinate periphery into squamose square somewhat descending spines; base flattened, radiately striate, and with four to six concentric irregular subnodose liræ; aperture very oblique, wide: lip scalloped, chanelled at outer angle; columella bidentate below, its face slightly grooved. Alt. 40, diam. 45 mill.

Honduras (Reeve); *West Indies.*

T. corolla Reeve is synonymous.

A. TUBEROSUM Phil. Pl. 64, figs. 57, 58.

This thick-shelled Trochid stands near to *T. cælatus*, but is distinguished by the following characters; the whorls are flat, not arched, in the middle; the superior nodules are situated near to the suture, are hemi-sphærical and solid; the last whorl has but a single row of nodules; the carina is sharper, the base flatter, with only three concentric nodose liræ; the aperture is lower, more rhomboidal; color reddish brown, more or less verging on violet.

Coast of Mexico.

I have translated from Philippi the more important portion of his description. I am unable to identify the form with any shells I have seen. It is probably immature.

A. PLICATULUM Philippi. Pl. 64, figs. 62, 63.

Shell strictly conic, imperforate, yellowish white; whorls planulate, the last acutely angled, obliquely plicate, the folds small, about forty in number on the body-whorl, interrupted by two spiral furrows, of which the upper is in middle of the whorl, the lower midway between that and the wavy lower margin of the whorl; base nearly flat, with six strong, elevated concentric liræ, and radiating lamellose striæ. Alt. 23, diam. 25 mill.

Habitat unknown.

Known to me only by Philippi's figure and description from which the above is taken. It probably does not belong to this group.

Subgenus IMPERATOR, Montfort, 1810.

Shell large, trochiform, concave and umbilicate below, carinated and spinose at periphery, whorls convex and granulose above; operculum oval, outside smooth, obsoletely unicostate.

Australo-Zealandic Province.

Canthorbis Swainson, 1840, and in part *Guildfordia* Gray, 1850, are synonyms.

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A. HELIOTROPIUM Martyn, 1784. Pl. 56, fig. 87.

Shell large, depressed-conic, below widely umbilicate and concave, spire dome-shaped, of 5 convex whorls; suture rendered zigzag by the prominent compressed triangular recurved vaulted spines which arm the acutely carinated periphery; whorls above and below with numerous spiral series of granules; umbilicus wide, deep, coarsely obliquely striate within; aperture transversely oval, oblique, pearly within, peristome continuous; columella slightly dilated, impinging upon the umbilicus; color brownish or purplish above, light below.

Alt. 50–60, diam. 100–120 mill.

New Zealand; Hauraki Gulf, Foveaux Sts., Cook's Sts., Bay of Tasmania.

Operculum (pl. 59, figs. 5, 6) oval, with excentric nucleus; outside smooth, obsoletely unicostate.

The synonyms are. *Trochus solarium imperalis* etc. Chemnitz, *T. imperialis* Gmel., and of most authors, *Imperator aureolatus* Montfort, and *Guildfordia heliophorus* Gray.

This large handsome species was brought to Europe for the first time by the famous Captain Cook.

Subgenus GUILDFORDIA Gray, 1850.

Shell wheel-shaped, imperforate; low-conic and granulose above, convex below, periphery armed with long slender radiating spines, which are concealed at the sutures; operculum flat, with a subobsolete arcuate rib outside.

Japonic Province.

A. TRIUMPHANS Phil., 1841. Pl. 58, figs. 67, 68.

Shell low-conic, imperforate, metallic brownish-purple above, nearly white below; whorls 6, slightly convex above; body-whorl armed around the carinate periphery with long slender closed tubular radiating spines, about eight in number on the body-whorl, and which are reabsorbed as the growth advances leaving only short stumps to festoon the sutures; upper surface with close revolving series—generally eight to ten on the last whorl—of minute laterally compressed granules; base slightly convex, usually with a marginal row of granules, and several rows surrounding the central callus; aperture transversely ovate, angulate and channelled at peripheral carina, iridescent within; peristome sinuous above; umbilical re-

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gion covered with a heavy callus, more or less stained with pinkish, somewhat excavated at center, and obsoletely spirally ridged.

Alt. 25, diam. (including spines) 70 mill. *Japan.*

Operculum (pl. 60, fig. 60).

T. guildfordiæ Reeve is a synonym.

Subgenus BOLMA Risso, 1826.

Shell turbinate, spire conic, imperforate, whorls rounded at the periphery, the upper ones spiny, base convex; operculum nearly round, nucleus excentric, outside polished, concave in the middle, with a convexity or rib upon the center of the spiral.

Mediterranean and Japanese Seas.

Tubicanthus Swains., 1840, is a synonym.

In the Mollusca of the Challenger, p. 131, Watson corrects the orthography of this name, making it *Bolina*. But I find that Gray and authors generally have not deviated from the orthography of Risso. (see *Hist. Nat. de l'Europe méridionale* iv, p. 117).

A. RUGOSUM Linn., 1767. Pl. 40, fig. 20; pl. 56, fig. 85.

Shell solid, conic, imperforate, brown or cinereous; suture canaliculate, bordered below by a series of curved radiating tubercles; whorls 6–7, obliquely lamellose striate, the upper ones carinate and tuberculate or spinose at the periphery, the last descending, rounded or bicarinate, spirally lirate; base conspicuously radiately striate; aperture obliquely, transversely oval, pearly within; columella arched, white, and pearly, with an orange callus dilated over the umbilical region and extending over the parietal wall. Alt. 50, diam. 55 mill.

Mediterranean Sea; Atlantic shores of Spain and S. W. France; Azores, Madeira and Canary Is.

Operculum (pl. 60, figs. 39, 40) short-oval, brown within, with four whorls, the nucleus situated one-third the distance across the face; outside bright orange, polished, with a spiral callous ridge.

T. cumanensis Val. is a synonym.

A. MODESTUM. Reeve, 1842. Pl. 55, figs. 63, 64.

"Shell imperforate, conically turbinated, orange-rose; whorls convexly sloping, then encircled with two rows of scales, papillary-grained throughout; base rather flat, tinged with chrome orange." (*Reeve*). *Japan.*

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Var. GIRGYLLUS Reeve, 1861. Pl. 55, fig. 65.

"Very closely related to the preceding, but distinguished by a more square form, while the scales are curiously expanded."
(*Reeve.*) *China.*

A. TURSICUS Reeve, 1848. Pl. 48, fig. 35.

Shell somewhat pyramidally ovate, imperforated; sutures of spire excavated; whorls spirally squamately ridged, slanting around the upper part, sharply angled, erectly squamate at the angle; aperture small; yellowish, beautifully rayed with scarlet red.

Alt. 22, diam. 22 mill.

Philippine Is.

Calcar turcicus (Rve.) Fischer is the same.

Reeve's figure and description are copied above. Of this form Mr. E. A. Smith says:

This beautiful species is well characterized by its style of painting. It is whitish with broad scarlet rays, particularly distinct on the sloping upper surfaces of the whorls; these are sometimes edged with black posteriorly, and the suture is more or less stained with that color. The lower part of the body-whorl is for the most part scarlet with a few narrow white streaks (sometimes black-spotted) radiating from the umbilical region. The operculum is white, thick, convex, and granose externally. (*Zoöl. Coll. H. M. S. 'Alert.' p.* 504.)

T. tursicus was collected by the 'Alert' at Darros Island, one of the Amirante group. I have copied on pl. 69, fig. 27, Mr. Smith's figures. The species apparently is not a *Bolma*, but without examining the shells and ascertaining the position of the nucleus and nature of the whorls of the operculum, I am not able to form an opinion as to its true position.

Subgenus CYCLOCANTHA Swainson, 1840.

Shell conic or depressed trochiform, usually imperforate; whorls above smooth, granulate or plicate; periphery spinose, tuberculate, or with a projecting flange; base convex, flat, or concave, concentrically lirate; columella with a more or less obvious tubercle at the base; operculum oval, convex outside, with a more or less prominent curved central rib, its terminations connected or nearly so by a straight short accessory rib.

Indo-Pacific, Australo-Zealandic and Japonic Provinces.

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Synonyms: *Stella* (Klein) H. and A. Adams, 1858, (type, *A. asteriscus* Rve.), *Calcar* Montfort, 1810, (type, *A. calcar* Linn.?) and *Carinidea* Tenison-Woods, not Swainson.

There has been considerable diversity of opinion regarding the group above defined, both as to its contents and its proper designation. *Stella* was the first name proposed for it; but since the nomenclature (almost) universally adopted by zoölogists dates from the publication of the tenth edition of Linnæus (1758), we are compelled to reject the names proposed by Klein in 1753. This course is rendered the more imperative by the nature of Klein's work; for his "genera" are as often denominated by a phrase as by a single word. *Calcar* of Montfort was probably founded on a species of this subgenus. But this is very uncertain, as his figure might belong to any one of several very different forms. (See also Fischer, *Man. de Conch.*, p. 813.) As to *Carinidea* Swains., which Tenison-Woods has supposed to include the group of *A. fimbriatum*, *A. tentoriiforme* etc., there is no warrant for using it in any such sense; for Swainson's two types are (1) an *umbilicated* species of *Trochus*, and (2) a species of *Uvanilla*, (*A. buschii* Phil.). *Hercoles* Montf. referred to this group by some authors, is not a mollusc. As to the limits and contents of *Cyclocantha* as here defined, I am aware that there is room for controversy. Fischer and others have distributed a portion of the species among several adjacent subgenera. I have included with considerable hesitation *A. fimbriatum* and *A. tentoriiforme;* but I do not think that they would be any better placed with *A. olivaceus* etc. in *Uvanilla*.

It is very difficult to express in a diagnosis the differences between the shells of this group and of Astralium, *s. s.* Both contain flattened wheel-shaped umbilicate forms, with long peripheral spines, and both have compact trochiform species. The two groups occupy almost opposite areas upon the globe.

A. CALCAR Linn., 1758. Pl. 52, figs. 27, 29, 30; Pl. 56, fig. 74.

Shell conoid, more or less depressed at apex; grayish greenish, or brownish cinereous; whorls 6, flattened above, and radiately plicate, the folds rather unequal and irregular; periphery carinated spinose, bearing about twelve radiating more or less foliated spines upon the body-whorl; last whorl deeply descending toward the aperture; base convex, concentrically more or less densely squamosely lirate, the outer liræ generally prominent and subspinose, sometimes causing the periphery to appear bicarinate; aperture

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transversely oval, very oblique, generally golden within, and stained with purple or blue on the columella. Alt. 28, diam. 40 mill.

Indian Ocean; Australia; Philippines; New Caledonia; Java, etc.

Operculum oval, nucleus submarginal; outside deep bluish-green, excavated around the upper margin and near the middle, edges rugose, center nearly smooth.

Trochus aculeatus Gmel. is a synonym.

An extremely variable species. In form it may be either conic with nearly flat base, or flat above with very convex and umbilicated base. The spines are generally triangular and obliquely wrinkled above, but are often square and elaborately foliated at the extremities. Restricting the typical *calcar* to shells with moderately exserted scalariform spire, depressed apex, and body-whorl deflected toward the aperture, we may define several varieties which are typically quite distinct, but which, in the large series before me, are connected with each other and with the type by insensible gradations.

Var. HELICINUM Gmel. Pl. 52, figs. 28, 31.

Last whorl not descending; spire conical, not much depressed at apex; marginal spines generally short. Usually larger than the typical form. A specimen before me measures: alt. 40, diam. 70 mill.

Var. LACINIATUM Gould. Pl. 53, figs. 32, 33.

Shell bullet-shaped in the adult; aperture subcircular, white within; columella generally stained with purple.

Alt. 28, diam. 22 mill.

Philippines (Gould), Viti Is.

Young shells are like var. *helicinum*; the adults are very different in shape, and sometimes even more elongated than in the figure.

Var. PLANORBIS Pilsbry. Pl. 56, figs. 75, 76.

Spire planulate, scarcely at all exserted; base very convex, umbilicated. Alt. 10, diam. 27 mill.

A curious form, very different from the preceding.

A. STELLARE Gmel., 1788. Pl. 55, figs. 66–68.

Shell imperforate, conoid, solid, more or less elevated, whorls 5–6, obliquely radiately costate, imbricately spinose at periphery, the last carinated, carina with about ten long vaulted spines; base

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with about ten concentric squamose liræ, columella oblique, white, generally rosy margined, rarely bluish; aperture angulated.

Alt. 34, diam. 35 mill.

East Indian Seas.

Operculum (pl. 60, fig. 67) granulose outside, white or green. Animal (fig. 68) without lateral filaments.

T. chemnitzii Val. and *T. asperatus* (Lam.) Phil. are synonymous.

This species seems to be very closely allied to *A. helicinum* Gmel.

Var. ASTERISCUS Reeve, 1842. Pl. 55, fig. 69.

Shell conical; whorls obsoletely wrinkled, produced at the carina into prominent vaulted spines; basal callosity rose-red or blue-green.

Port Essington, Australia.

Identified by Fischer with *T. chemnitzii* Val., but that form seems to me to differ in no respect from typical *stellare*.

A. LAPILLUS Reeve, 1861. Pl. 64, fig. 49.

Imperforate, obtusely turbinated, fulvous, tinged with red at the base; whorls convexly sloping next the suture, then tumidly rounded, longitudinally rudely ribbed, ribs irregularly wrinkled and tuberculated; base convex, very closely irregularly scaled. (*Reeve.*)

Habitat unknown (Reeve); Levuka, Fiji, 12 fms. (Challenger Expd.)

Watson, who places this species in "Bolĭna" (= Bolma), says: "There are two specimens of this species in the British Museum, which differ from one another in the number of spirals on the base and have only a faint tinge of purple at the pillar. In the two Challenger specimens, the scaly spirals are much fewer, and a brilliant crimson streak to the left of the pillar, and also in front of it on the left corner of the basal mouth lip, is a marked feature. I observe, however, that as is often the case with these brilliant colors, the crimson has somewhat faded during the years the shell has been in my hands."

A. SIRIUS Gould, 1849. Pl. 45, figs. 93–95.

Shell small, low pyramidal, pale emerald green; whorls 4, acutely compressed at periphery, above with about ten oblique folds on the lower half of the whorl, each of which is produced into a triangular spine at the periphery, and with spines intercalated making about eighteen on the periphery of last whorl; surface corrugated by oblique wrinkles; base nearly flat, imperforate, with about five

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delicate, distantly nodose, concentric, inequal liræ; aperture circular, augulate at carina, lip below horizontal; columella smooth, rounded, arcuate. Alt. 7½, diam. 12 mill.

Australia.

Seems to be a young shell.

A. PETROSUM Martyn, 1784. Pl. 64, figs. 65, 66.

Shell conic, imperforate, solid, greenish or cinereous; whorls 6, above planulate, obliquely radiately plicate or wrinkled; periphery bicarinate, with two rows of rather short radiating spines, about 12 in number on the body-whorl in the upper row, smaller and more numerous in the lower; base flattened, concave toward the center, concentrically densely squamose-lirate; aperture transverse, white, pink or blue inside, channelled at the carina; peristome crenulate, columella wide, with a slight semilunar groove and a denticle near the base, generally more or less purplish, pink or bluish.

Alt. 30–35, diam. 32–40 mill.

Viti and Hawaiian Is.; New Caledonia; Indian Ocean.(?)

Operculum (pl. 64, fig. 64) oval, rugose, outside, with a broad central curved callosity; center excavated; color usually the same as the columella.

T. rhodostomus Lam., and *T. tuberosus* Reeve (not Phil.) are synonyms. *T. spinulosus* Reeve is probably a depressed form of this species.

Martyn's name has been overlooked by most authors, but I see no reason for rejecting it for that of Lamarck. His figures in the "Universal Conchology" are so superior as to compare favorably with modern work; and represent unmistakably the typical form, with the two subequal rows of spines upon the periphery.

Var. CONFRAGOSUM Gould, 1848. Pl. 54, fig. 56.

Shell low conical, rugose, the wrinkles small, rounded, irregular, oblique, slightly squamose here and there; whorls 6, somewhat shouldered above, declivous at the upper part, obtusely biangulate toward the base; periphery angulate, stellate by the projection of folded ribs; base plane, encircled with about eight squamose ridges.

Dean's Is., Paumotus Group.

I have copied Gould's figure of this form and have added two which are identified by Dr. Fischer with it. These last are much more prominently plicate above, and have colored columella, a character not mentioned by Gould.

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Var. PLICATOSPINOSUM Pilsbry, 1888. Pl. 54, figs. 59, 60.

Rather low-conic, conspicuously radiately plicate above, the folds somewhat sigmoid and oblique, bearing a series of short rounded knobs above, and terminating in short spines, eighteen to twenty in number, at the carinated periphery; base flat; squamosely lirate; aperture tinged with green, especially at the columella.

Alt. 20–25, diam. 25–30 mill.

Hawaiian Is.

Operculum (pl. 60, fig. 50) deep green, wrinkled.

Var. VIRESCENS Pease, 1869. Pl. 49, fig. 50.

Shell conoidal, slightly swollen at the middle; whorls concave above, rudely irregularly rugosely plicate; lower margin of whorls encircled by two rows of nodose contiguous scales; upper whorls deeply pitted, the last acutely carinated at periphery; base planulate, with about nine concentric unequal squamose lirae.

Alt. 25, diam. 25 mill.

Ins. Tarawa, Polynesia.

A. HENICUS Watson, 1879. Pl. 52, figs. 25, 26.

Shell conical, elevated, light yellowish ruddy, paler below; whorls 7–8, apex round, first whorl flattened, upper three whorls radiately ribbed, the following radiately slightly plicate in the direction of lines of growth, with a spiral series of rather large white separate beads upon the edge of the flattened shoulder below the suture, and six series of distinct small beads, separated by interstices of half their breadth upon the slope of the whorl; periphery sharply bicarinate, the upper carina stellate with sharp compressed hollow spines, about twelve in number on body-whorl; lower carina with thirty to thirty-five vaulted scales, becoming spines toward the aperture; between the carinæ there are four rows of beads; base flat, with about ten concentric rows of very regular beads; aperture oblique, white within; columella bluntly toothed below; umbilical tract polished, slightly ridged, white. Alt. 20, diam. 25 mill.

Matuka, Fiji, 315 fms. in coral mud.

Operculum (pl. 60, fig. 59) oval, within flat, brown; outside thick, white, granulose, with a slight flange on the outer margin.

Differs from other species of the *petrosum* group in being granulate instead of plicate on the upper surface.

A. PREVOSTI Sowerby Jr., 1886. Pl. 63, fig. 38.

Shell rather wide-conic, imperforate, green, brown tinged and banded; whorls about six, subconvex, sloping, encircled by minute

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granulose liræ, above nodose-plicate, last whorl subacutely angled below, the angle bearing square, thick vaulted scales; base imbricately quadri-lirate; aperture suboblique; columella arcuate, silvery, umbilical callus white.

Habitat unknown.

"A trochiform species in which the longitudinal ribs may be only faintly traced, leaving nodules at the top of the whorls, and strong obtuse square looking scales at the margin, while the whorls are encircled in the middle with two or three rows of minute granules."

Sowerby's description and figure are given. Compare *A. tuberosum* Phil. p. 227.

A. PAGODULUM Sowerby Jr., 1886. Pl. 63, fig. 28.

"Shell imperforate, conical, orange-drab; whorls slopingly convex, obliquely wrinkled-plaited, plaits, rather large, swollen, basal margin of the whorls prickly scaled, base scale-ridged around the callosity."

Habitat unknown.

Trochus aculeatus Reeve (preoc.) is a synonym.

The original figure and description are given.

A. PAGODUS Tenison-Woods, 1879. *Unfigured.*

Shell narrowly pyramidal, thin, pale roseate, variegated with wide longitudinal olive bands; whorls 6, concave, very acutely angular at the suture, armed with a regular row of short spines, and girdled with four or five lines of indistinct granulose liræ; spines numerous, obtusely angular, concave, 18 in number at the periphery of the last whorl; apex acute; aperture obliquely quadrate, depressed smooth inside, nacreous; labrum acute; columella curved, truncate; base quite flat, spirally lirate and very finely transversely striate, pale yellowish white and very faintly spotted with brown.

Alt. 15, diam. 18 mill. (*Tenison-Woods*)

Moreton Bay, Australia.

The original description is giving above. I do not know the exact systematic position of the form.

A. HÆMATRAGUS Menke. Pl. 54, figs. 57, 58.

Shell imperforate, pale ashen, elevated-conic, apex acute; whorls 7, planulate above, with radiating oblique folds, which are produced into short spines at the periphery; last whorl carinated, with ten to twelve spines in a single series; base plano-concave, concentrical-

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ly squamose-lirate; aperture transverse, channelled at the carina; columella arcuate, purple or blue margined, dentate at base.

Alt. 27, diam. 32 mill.

Japanese and Chinese Seas.

T. columellaris Phil. and *T. gratus* Phil. are synonyms, and in part, perhaps, *T. asteriscus Rve.*

Base more concave than in *A. petrosum*, peripheral spines in a single series, and finer than in that species.

A. HEXAGONUM Phil. Pl. 64, figs. 44–46.

Shell perfectly conic, imperforate, reddish-white, redder in the furrows, costate and obliquely rugose-sulcate, the ribs six in number, subcontinuous, terminating in small vaulted spines at the base; periphery acute, angulate, stellate, with twelve points; base flat, squamosely eight or nine lirate; aperture suborbicular, angulate at outer margin. Alt. 13, diam. 15 mill.

Habitat unknown.

Philippi's description and figure are given. The species may be an immature form of *A. hæmatragum.*

A. SEMICOSTATUM Kiener. Pl. 63, figs. 15–18.

Shell elevated-conic, solid, imperforate, olive-brown or cinereous, apex acute; whorls 6–7, sharply carinated, upper surface concave, longitudinally more or less finely and irregularly plicate below the sutures; coarsely plicate on the lower half of the whorls, the folds terminating in short nodes at the periphery, twelve to sixteen in number on the last whorl, and also scalloping the sutures; base flat, somewhat depressed around the middle, finely concentrically lirate and radiately striate, the lirae about eight to sixteen in number; aperture very oblique, suboval, white within, slightly channelled at the carina, but scarcely angulate; columella bluish, rosy or white, short, curved, dentate below; base of aperture horizontal, sometimes with a submarginal row of minute tubercles within.

Alt. 27, diam. 25 mill.

Indian Ocean; Australia (?)

This is *Trochus stellatus* of Philippi and of Reeve. It may possibly be the *stellatus* of Gmelin. That species was said by him to be West Indian.

In some specimens the peripheral spines are rather long and directed outward. The lirae of the base are sometimes coarser than the figures indicate; and in fully matured individuals the outer ones be-

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come obsolete; finally, the base of the aperture acquires the armature shown in fig. 18.

A. BABELIS Fischer, 1874. Pl. 52, figs. 21, 22.

Shell imperforate, conic, elevated, pale yellowish, apex acute; whorls 7, slightly convex, obliquely radiately costate with distant folds, which are prominently nodulose at the sutures and periphery; interstices smooth; last whorl carinated, the carina bearing about eight nodules; base flat, smooth, with fine oblique incremental striæ; aperture angulated; columellar region white, blue margined, unidentate at base. Alt. 20, diam. 19 mill.

Habitat unknown.

I have not seen this species. The original figures and description are given.

T. barbelis Sowb. is the same.

A. HEIMBURGI Dunker, 1882. Pl. 58, figs. 65, 66.

Shell conic, imperforate; whorls 5, flattened, subgranosely densely lirate; periphery carinated, armed with compressed imbricated subdeflexed spines; base plano-convex, ornamented with spiral subimbricated liræ; columella with an oblong excavation at its termination; aperture subrotund, silvery margaritaceous within; shell whitish, subroseous at the base. Alt. 12, diam. 20 mill.

Japan (?)

Operculum and animal unknown.

It is *Uranilla heimburgi*, Dkr. I am undecided about the real position of this species, but do not believe it to belong to *Uranilla* as restricted in this work.

***

The following species have been placed in *Uranilla* by Fischer; but they do not seem to be as nearly allied to *U. olivacea*, the type of that group, as to Cyclocantha. The dentition is unknown in all of them.

A. ROTULARIUM Lamarck, 1822. Pl. 54, fig. 55; pl. 64, figs. 50, 51.

Shell subdepressed, conoid, white, imperforate; spire subacute; whorls 6, obliquely finely costulate; with numerous prominent imbricating laterally compressed plicæ at the sutures; last whorl carinated, carina plicate-nodose, base convex, squamosely concentrically lirate; columella arcuate, white, not dentate; aperture oblique.

Alt. 25, diam. 36 mill.

Australian Seas (Reeve).

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A. NOBILIS Gray, 1847. Pl. 63, fig. 37.

"Shell trochiform imperforate, pale white; spire conical; whorls nearly flat, smooth, the outer edge of the upper whorls being furnished with a broad expanded margin, which is broadly plaited on the upper side; the plaits becoming thicker and more prominent on the edge of the last whorl; front [base] of last whorl with regular spiral ridges, each crossed with regular imbricate-arched scales, the second and third near the circumference largest, and those nearest to them closer together" aperture crenated, throat silvery pearly."

Darnley Is., S. Pacific.

The original description and figure are copied. I have not seen this species; it is evidently closely allied to *A. rotularium.*

A. FIMBRIATUM Lam., 1822. Pl. 54, figs. 46–54.

Shell conic, more or less depressed, imperforate; whorls 5–6, flattened above, obliquely striate, generally more or less longitudinally finely plicate below the sutures, and spirally lirate; periphery acutely carinated, the margin pinched out into a thin, generally undulating flange or rim, which is usually projecting above the sutures; last whorl generally descending; base slightly convex, spirally lirate and radiately striate; aperture very oblique, transverse-oval, channelled at the outer angle, white or pinkish within; columella broad, flat; color grayish, variegated above with brown, base lighter. Alt. 20, diam. 26 mill.

Australian Seas; Tasmania.

An extremely mutable type. The following varieties have been considered distinct species, but I cannot find characters stable enough to separate them.

Var. PILEOLUM Reeve, 1842. Pl. 54, figs. 53, 54.

Shell grayish white; sculpture obsolete above and nearly so below; keel very broad and thin. Alt. 23, diam. 34 mill.

T. limbiferus Kiener is synonymous. Neither was ever described by their authors.

The aperture is often more deeply deflected than in the specimen figured. The young are plicate above as in *A. fimbriatum.*

Var. CUCULLATUM Kiener. Pl. 54, figs. 50, 51.

Shell conical; whorls 7–8, somewhat plicate, and except the upper ones, densely granose-lirate above and below.

Alt. 35, diam. 46 mill.

More conical and elevated than the type.

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Var. SQUAMIFERUS Koch. Pl. 54, fig. 52.

Similar to the type; but flange not exserted at the sutures, and scarcely undulating. Alt. 19, diam. 30 mill.

A. TENTORIIFORME Jonas, 1845. Pl. 53, figs. 41, 42.

Shell elate-conic, imperforate, solid, pale yellowish, spire elevated, whorls 7–8, very obliquely finely wrinkled, flat above, base concave; periphery acutely carinated, above the carina obscurely longitudinally folded; base with numerous regular-concentric squamose liræ; aperture very oblique, silvery within, angled at the carina, basal margin nearly straight, tinged with pink; columella short, wide, arcuate, sometimes pinkish, terminating in a tubercle below; parietal callus usually covering more than half the surface of the base, its margin often elevated. Alt. 35, diam. 35 mill.

Australia.

Operculum (pl. 60, fig. 46) oval, brown within with sublateral nucleus; outside white, with a curved sub-obsolete central rib and an obsolete short basal rib.

Synonyms: *T. urvillei* Phil., *T. georgianus* Quoy, *fide* Kiener.

Some specimens are more elevated, others more depressed than the figures.

A. AUREUM Jonas, 1844. Pl. 64, figs. 52–54.

Shell small, depressed-conic, solid, golden yellow or olive, imperforate; spire low-conic; whorls 5, scarcely convex above, plicate at the sutures, the folds becoming fainter and frequently bifurcating toward the periphery, spirally lirate, the liræ below rather coarse, beaded, above finer, cutting the folds more or less into granules; last whorl generally descending toward the aperture, compressed toward the periphery, which is subangular except in large specimens; aperture rather small, oblique, pearly white, columellar callus dilated over the umbilical region, and excavated there, and with an indistinct denticle near its base. Alt. 10–14, diam. 12–19 mill.

Australia.

A very attractive little species, quite distinct in aspect from its nearest allies.

Subgenus UVANILLA Gray 1850.

Shell conic, imperforate, periphery sharply carinated, carina nodose, spinose or nearly smooth; whorls flattened above, flat or

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concave below; operculum oblong, nucleus nearly on the margin, subterminal, outer face with two strong ribs.

Panamic and Californian Provinces,

Carinidea Swains., in part, is a synonym.

A. OLIVACEUM Wood. Pl. 53, figs. 39, 40.

Shell conic, acute, imperforate, olive-green or brownish; whorls 6–7, slightly convex, obliquely finely striate, longitudinally finely plicate, the folds at right angles to the striæ, and interrupted one-third of the distance from the suture to the periphery by two spiral impressed furrows; suture undulating, linear; peripheral carina slightly nodose; base concave, radiately finely lamellose striate, with a somewhat nodulose rib revolving midway between the periphery and the center; aperture silvery white within, oblique, angled and channelled at outer side; base nearly straight; columella arched, deeply excavated at position of umbilicus, the whole umbilical area brilliant vermillion, with a black spiral rib. Alt. 55, diam. 65 mill.

Central America to Gulf of California.

Operculum (pl. 59, figs. 24, 25) oval, black to yellowish inside, with marginal apex, frequently concealed by growth of the last whorl; outside white, strongly bicostate. *T. erythropthalmus* Phil. and *T. brevispinosus* Val. are synonyms.

A. BUSCHII Phil., 1844. Pl. 53, figs. 37, 38.

Shell conic, imperforate, solid, olivaceous brown, maculated obscurely above with brown, green or white; whorls 7, longitudinally costate below the sutures and above the periphery, with two spiral series of tubercles around the middle of the flattened upper surface, or sometimes finely irregularly plicate over the whole upper surface; periphery acutely carinated, bearing numerous short compressed triangular radiating spines; base flat, densely radiately lamellose-striate, with a strong rib revolving midway between periphery and center; aperture oblique, pearly white within, transversely ovate, deeply channelled at periphery; columellar region white, strongly bicostate, deeply excavated at position of umbilicus; parietal callus not much extended. Alt. 30–40, diam. 40–50 mill.

Panama to the Gulf of California.

Operculum (pl. 59, fig. 27) oblong, nucleus submarginal; outside white, with a strong curved central rib, its terminations joined by a A-shaped ridge.

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late, with concentric tuberculate liræ; umbilical tract white, callous, depressed; aperture transversely dilated, subrhomboidal, angulate.

Alt. 65, diam. 95 mill. *Japanese Seas.*

A rare species in collections.

A. TAYLORIANUM E. A. Smith, 1880. Pl. 63, fig. 31.

Shell turbinate-conic, flattened below, imperforate, purple rose colored, marked with indistinct and very oblique strigations above, below white; spire short-conic, with rectilinear outlines; whorls about 8, subconcave above, slightly convex, with a subsutural subsquamose carina, and encircled by numerous subequal granulose liræ; last whorl acutely carinated below the middle, slightly excavated above and flat below the carina; base white with an outer zone of purple red, concentrically ornamented with series of granules; umbilical region with a white smooth callous, its margin stained with yellow. Columella arcuate, white calloused.

Alt. 40, dia[redacted]mill.

Habitat unknown.

The original figure and description are given.

It probably does not belong to *Pomaulax*. The operculum is unknown.

Subgenus PACHYPOMA Gray, 1850.

Shell similar in form to *Pomaulax*, but umbilical tract scarcely ribbed; operculum oblong, narrow, the nucleus terminal; outside *very convex*, white, smooth, with a broad central convexity and obsolete narrow side ribs.

Californian Province.

I restrict this subgenus to *A. inequale*, the first species mentioned by Gray in his description. *A. cælatum* Gmel., usually classed here, belongs to a wholly different section of the genus.

A. INEQUALE Martyn, 1784. Pl. 57, figs. 51, 52.

Shell conic, imperforate, rather solid, with a chestnut brown cuticle, lighter beneath; whorls 6–7, planulate above, sutures slightly impressed, bordered below by a series of obliquely descending corrugations, which are cut into granules by from one to five spiral furrows; periphery carinate, subspinose on the upper whorls, usually nearly smooth on body-whorl; base nearly flat, concentrically lirate, the liræ more or less tuberculate, five or six in number, their interstices regularly striate; aperture subtriangular, white within,

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the lower margin fluted; columella arcuate, broad, excavated at position of the umbilicus, and terminating in a tooth-like prominence below. Alt. 45, diam. 55–62 mill.

Western America, Acapulco to Vancouver Id.

Operculum (pl. 60, figs. 68, 68a) inside deep brown, convex at upper, concave toward lower margin; outside smooth, or rugose at the distal extremity, and white, brownish toward the nucleus.

Synonyms, *Trochus gibberosus Zealandiæ Novæ* etc., Chemnitz, *Trochus gibberosus* (or *Pachypoma gibberosum*) "Chemnitz" of authors, (not *Trochus inaequalis umbilicatus* etc., Chemnitz,=*T. inæqualis* Gmel. a species of *Trochidæ*), *T. diadematus* Val., and *T. ochraceus* Phil.

The name *inequalis* Martyn, here adopted for this species, has four years priority over Chemnitz's name. Besides, the latter author was a polynomialist, and merely copies Martyn's excellent figures of the species.

Genus LEPTOTHYRA (Carpenter) Dall, 1871.

Shell small or minute, globose-depressed, solid, compact; umbilicate or imperforate, whorls 5–7, spirally sculptured, the last generally somewhat deflexed at the aperture; aperture subcircular, white and nacreous within; columella generally but not always bluntly denticulate near the base. Operculum subcircular, nearly flat or concavo-convex, inside with a very thin corneous layer, slightly convex, with many gradually increasing whorls, the nucleus subcentral; outside calcareous, subspiral, with a slightly convex concentric elevation or ridge around the margin, most prominent at its termination, the middle portion concave and more or less rugose.

The species are numerous, inhabiting nearly all tropical and subtropical seas; but most numerous in the Pacific.

The synonymy includes *Collonia* Gray (in part), *Collonia* of most authors, *Leptothyx* and *Homalopoma* Carpenter (preoc.), *Cantrainea* Jeffreys, *Cantraineia* Fischer, *Anadema* H. & A. Adams. The genus is very homogeneous, and neither of the subgenera proposed, (*Cantrainea* Jeff. for *L. carinata*, and *Anadema* Ads. for *L. coelata* Ad. have sufficient characters for any systematic rank.

The characters of the dentition are discussed on p. 188. The rank and position of this group has been the subject of considerable controversy; but partly, perhaps, on account of the minute size of the species, partly because of the scattered and inexact condition of

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and by Woodward. (Pl. 60, figs. 61, 62.) I do not understand the discrepancy between the description of the operculum and Deshayes' figure of it. The main character distinguishing *Collonia* from *Leptothyra* seems to be the peculiar peristome of the former. Fischer says of it: "péristome continu, épaissi, dilaté, excepté sur le bord columellaire; labre épais, parfois subdoublé ou subrefléchi. * * * *

Les coquilles de ce groupe ne paraissent pas avoir été nacrées. Leur opercule ressemble à celui des *Leptothyra*, mais leur ouverture rappelle celle des *Liotia*." (Manuel de Conch., p. 812.)

There are numerous Tertiary species.

NOTE. The operculum of *Leptothyra* frequently offers excellent specific characters, just as it does in *Turbo* and *Astralium;* and attention to these will often enable one to readily separate species of which the shells exhibit considerable similarity.

L. CARPENTERI Pilsbry, 1888. Pl. 39*a*, figs. 26–29.

Shell small, globose, very solid, imperforate, spire conic, more or less depressed; suture moderately impressed; whorls 5, slightly convex, the last decidedly deflected toward the aperture, encircled by about fifteen subequal spiral liræ, separated by interstices about as wide as the ridges; incremental striæ generally strongly developed, causing the liræ to appear nodose or somewhat irregular, and the interstices to appear pitted; aperture oblique, pearly white within, about half the length of shell; columella arcuate, base obsoletely uni- bi- or tri-dentate; color red, ashen or purple.

Alt. 8, diam. 8–9 mill.; dark form alt. 5, diam. 5 mill.

Cape St. Lucas, L. California to Vancouver Id.

Operculum (pl. 60, fig. 66) rounded oval; outside much thinner and less elevated around the margins than that of *L. sanguinea*, slightly concave in the middle, nearly smooth.

This is *L. coccineus* of Troschel, not Mühlf., *L. californicus* von Martens, not of Philippi, *L. sanguineus* of Carpenter and authors generally, not of Linn., and var. *purpureus* Carpenter, (preoc).

The Californian shells appear to me to be quite distinct from the Mediterranean species; I have been unable to find, in the numerous specimens of the latter form which I have examined, any trace of the peculiar indentations in the grooves or of the uneven character of the liræ which are so conspicuous in the Californian species. The liræ of *L. Carpenteri* are generally smaller and more numerous; about five or six are visible on the penultimate whorl; and those

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upon the base are but little, if at all, narrower than the upper ones; whilst in *L. sanguineus* and *L. sangarensis* the difference in width is decided and constant. I have seen specimens of *L. carpenteri* strongly lirate both above and below. As to color, "the species is of all shades of crimson and purple, some specimens being banded with white, or having the red color of the ribs interrupted by oblique streaks of white; some specimens, excepting the dark apex, being pure white." (*Dall.*)

I did not adopt the varietal name *purpureus*, proposed by Carpenter, because it has already been twice used in this genus.

L. PAUCICOSTATA Dall, 1871. Pl. 63, fig. 27.

Shell small, depressed-globose, solid, imperforate; whorls 4, rapidly increasing, very strongly spirally lirate, the liræ seven to eight in number on the last whorl, separated by deep grooves, in which incremental striæ are evident; sutures canaliculate; aperture contracted, pearly white within; columella ending in a callous tubercle; color rusty brown or rose-red, frequently with alternating white spots on the ribs, interstices generally lighter, sometimes pure white.

Alt. 4, diam. 4 mill.

Monterey, Catalina Id. and San Diego, Cal.

Most nearly allied to the preceding, but differing sufficiently in the extremely coarse prominent ribs.

L. BACULA Carpenter, 1865. Pl. 39*a*, fig. 33.

Shell small, depressed-globose, solid, imperforate, rufous ashy; whorls 4, slightly convex, rapidly increasing, obsoletely but regularly spirally striate; aperture large, oblique, deflexed above.

Alt. 4, diam. 5 mill.

Collonia paucicostata Sowb. (not Dall) is a synonym.

Allied to *L. carpenteri*, but readily separated by the nearly obsolete spiral sculpture.

L. MARGINATA ("Nuttall") Reeve, 1848. Pl. 58, figs. 51, 52.

"Shell ovate, rather solid, imperforated, spirally striated, slightly grooved; aperture small; whitish stained and blotched with livid olive." (*Reeve.*)

Upper California.

I have copied Reeve's description and the figures of Reeve and of Sowerby—the latter said to be twice the natural size. If this shell ever came from California, which is very improbable, it might be a form of *L. bacula* Cpr. It is not the *T. maginatus* Nuttall mss., which is a species of *Trochida*.

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L. CUNNINGHAMI E. A. Smith, 1881. Pl. 57, figs. 56, 57.

Shell small, subglobose, perforate in the young state, when adult imperforate, of a rose-madder color; whorls 4½, the apical one whitish, the rest convex, and finely spirally striated, also marked with faint oblique lines of growth; suture rather deep; last whorl obliquely descending near the lip, somewhat flattened beneath near the center; aperture obliquely subcircular, iridescent within; columella pearly, spread over the umbilicus; labrum with a narrow pinkish margin within. Alt. 4½, diam. 5 mill. (*Smith.*)

Port Rosario and Portland Bay, Patagonia.

Operculum as usual in the genus.

L. SANGUINEA Linn., 1758. Pl. 49, figs. 48, 49; pl. 64, figs. 60, 61.

Shell small, very solid, orbicular, depressed, with conic spire; whorls 4½–5, convex, strongly spirally lirate, the liræ smooth, about twelve in number on body-whorl, three on penultimate whorl, not perceptibly crenulated by the very subtle incremental striæ; above the liræ are coarse, smooth, and generally irregularly spaced, interstices smooth, as wide or wider than the ribs; below more finely lirate; last whorl well rounded, deflected anteriorly; aperture somewhat contracted, oblique, pearly white within, peristome rather thick, its ends not converging, columella short, slightly arcuate, thick and heavy, terminating below in an obtuse tubercle, base of aperture sometimes bearing an inconspicuous dentiform callus at margin; color deep crimson. Alt. 6, diam. 7 mill.

Mediterranean and Adriatic Seas.

The species has also been dredged off the Atlantic Coast of France.

Operculum (pl. 60, figs. 54, 55) inside slightly convex, light yellow, with about ten very slowly and regularly increasing whorls, the last third of the outermost considerably widened; outside calcareous, white, flat, concave in the central area and coarsely rugose, outer margins with a slightly elevated very finely radiately wrinkled concentric rib, which is slightly more elevated near its termination.

The synonyms are *T. purpureus* Risso, *T. coccineus* Mühlf., and *T. belliæi* Payr.

The differential characters of *L. carpenteri*, *L. sanguinea* and *L. sangarensis* are pointed out under the descriptions of the first and last species. There is not the slightest occasion for any longer confounding these three unfortunate species. The occurence of the real *L. sanguinea* Linn. in Japanese waters still requires confirmation.

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L. SANGARENSIS Schrenck, 1861. Pl. 47, figs. 27, 28; pl. 64, fig. 59.

Shell small, turbinate-conic, almost trochiform, imperforate, solid, dark purplish-brown or reddish; sculpture consisting of fine crowded spiral concentric liræ on the base, which is very slightly convex, and coarse cord-like liræ above, about five or six in number on the body-whorl and with more or less minute lirulæ between them: incremental striulæ visible under a lens; spire elevated conic, subacute, the apical whorl white; suture deeply impressed; whorls 4–5; last whorl but slightly descending, subcarinate below the middle; aperture small, less than half the total length of shell, oblique, rounded, within pearly, and iridescent; outer lip rather thin; columella obliquely arcuate, rather broad and flattened, very obtusely subtuberculate just below the middle. Alt. 7, diam. 6 mill.

Japan.

T. corallinus Reeve (pl. 63, fig. 20) is probably synonymous.

Quite variable in its proportions, according to Schrenck, one of his specimens measuring, alt. 7½, diam. 8 mill.

This seems to be the shell which many authors have reported from Japan as *T. sanguineus* L. From that species it differs in the conic form, more finely lirate base, narrower ribs above, flatter base, etc. From *L. amussitata* the lack of distinct decussation will separate *sangarensis*. I was unfortunate enough to lose the only operculum of this form in my possession, before describing it.

L. AMUSSITATA Gould. Pl. 55, figs. 71, 72.

Shell globose-conic, imperforate, solid, uniform deep crimson; sutures deeply impressed; whorls 5, convex, spirally lirate, the liræ large and prominent on middle portion of whorl, alternating with smaller intercalated riblets; base very finely concentrically striate, the whole surface decussated by numerous regular oblique impressed lines in the direction of incremental striæ; last whorl descending anteriorly; aperture subcircular, oblique, less than half the length of shell, silvery within; columella slightly tuberculate at base.

Alt. 8–10, diam. 8–10 mill.

Japan.

Operculum (pl. 60, figs. 51, 52.)

Collonia rubra A. Ad., mss. is a synonym according to Sowerby.

A charming little shell, easily separated from its allies by the finely decussated surface.

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L. RUBRA Dunker, 1882. Pl. 69, fig. 26.

Shell small, solid, globose; whorls 4–4½, rotund, marked with subgranose transverse costulæ; suture obvious; aperture rotund, iridescent and pearly within; lip thickened.

Alt. scarcely 6, diam. 6–6½ mill. (*Dunker.*)

Japan.

Collonia rubra Dunker, Ind. Moll. Mar. Jap., p. 128, pl. 12, f. 7–9.

Nearly allied to *L. sanguinea* L., but differing in the sculpture of the ribs.

L. PURPURASCENS Dunker, 1882. Pl. 69, fig. 24.

Shell globose, whorls 5, rounded, separated by subcanaliculate sutures, transversely sculptured by unequal graniferous costulæ; aperture rotund, sulcate within and pearly; columella thickened.

Alt. 8, diam. 9–10 mill. (*Dunker.*)

Japan.

Collonia purpurascens Dkr., Ind. Moll. Mar. Jap., p. 129, pl. 12, f. 1–3.

I have not seen this species, nor *L. rubra* Dkr. Both are allied to *amussitata* Gould, and *purpurascens* may prove to be a synonym of that species. *L. rubra* seems to be distinct.

L. PURPURATA Desh., 1863. Pl. 54, fig. 61.

Shell minute, turbinate, subglobose, imperforate, somewhat depressed, vivid purple, white-fasciate in the middle; whorls 4, the first obtuse, the following convex, spirally sulcate, the last large; base a little depressed, white at center; aperture very oblique, circular, pearly within, margin thickened; columella arcuate, simple.

Alt. 1½, diam. 2 mill.

Mauritius.

Var. TRICINGULATA von Martens, 1880.

Subglobose, umbilicate; whorls 3, gradate, the last with three elevated contiguous cinguli; the upper one nodulous, brick-red, the basal white, encircled by a deep red band; aperture circular, white, columellar margin thickened. (*Martens.*)

Mauritius.

L. ROSEOCINCTA von Martens, 1880. Pl. 68, figs. 14–19.

Shell globose, imperforate, smooth, white, apex rosy, peripheral fascia rather wide, frequently composite, rose-colored, basal fascia narrow; whorls 3½, slightly convex, the last rotund; suture super-

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ficial; base slightly excavated at the position of the umbilicus; aperture oblique, circular; peristome white, thickened.

Alt. 1½, diam. 1½ mill. (*Martens.*)

Mauritius.

L. FOLINI Pilsbry, 1888. Pl. 57, fig. 58.

Shell minute, turbinate, subglobose, vivid blood red; whorls 4, the first depressed, subcarinated, apical whorl subcostate, transversely lirate, liræ rounded, the wide interstices regularly minutely transversely striate; last whorl large, umbilicate; aperture subcircular, right margin somewhat thickened, the left reflexed; columella simple, arcuate. Alt. 1·2, diam. 1·5 mill.

Mauritius.

This is *Turbo sanguineus* de Folin, (preoc.)

L. SEMILUGUBRIS Desh., 1863. Pl. 58, fig. 52*a*.

Shell small, turbinate, subglobose, white, marbled with black; spire somewhat obtuse; whorls 5, declivous above, spirally deeply sulcate, the sulci subgranulose; last whorl large, base perforate; aperture circular, pearly within, very oblique; columella arcuate, flat, truncate anteriorly. Alt. 3, diam. 3 mill.

Mauritius.

L. CARINATA Cantraine, 1835. Pl. 63, fig. 35.

Shell subconic, thick, glabrous; upper whorls carinated, the last depressed above, lightly striate in the median portion; base smooth, shining. (*Cantraine.*) Alt. 10, diam. 11 mill.

Mediterranean and Bay of Biscay, 125 *to* 731 *fms.*

Also found in the Italian and Sicilian Tertiary.

Trochus carinatus Cantr., Bull. Soc. Roy. Bruxelles, 1835, p. 387. (not *Trochus carinatus* Borson, Mem. Ac. Torino, 1822, which is apparently a species of *Astralium.*)

Trochus glabratus Phil., Fauna Moll. Sicil., 1844, is synonymous.

This deep water form of the Mediterranean and adjacent Atlantic, seems to be specifically identical with the Western Atlantic shells dredged by the CHALLENGER and the BLAKE and described under the names *T. indutus* Watson and *L. albida* Dall. I have before me specimens of the latter form which correspond very nearly with Cantraine's figures.

Var. PELORITANA Cantraine, 1835. Pl. 63, fig. 34.

Shell subconic, thick, very lightly striate, transversely subcostate the costæ subgranose; whorls convex; base shining, smooth.

Alt. 12, diam. 13 mill. (*Cantraine.*)

Trochus filosus Phil., 1844, is synonymous.

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L. INDUTA Watson, 1879. Pl. 63, fig. 36.

Small, conoidal, high, whorls tumid, base flattened; color white glossy; whole surface faintly marked with remote spiral threads, and very faintly scratched with closer microscopic striæ; whorls bluntly angulated in the middle, and the last is so, besides, at the base below the periphery; this angulation meets the outer lip; the the second and third whorls have two or three strong spiral threads, there are very many close unequal oblique lines of growth; of these the strongest rise in close-set infra-sutural puckerings, which on the third whorl resemble small beads; there is a glossy, thin ivory-white calcareous coat over a brilliant pearly white layer; spire high, fine-pointed; apex blunt, the smooth rounded 1¼ whorl scarcely projecting; whorls 6, of rapid increase, tumid, the penultimate rising swollen out of the suture; base a little flattened; suture linear, not impressed, a little coarse, slightly marginated by the up-lap of the succeeding on the preceding whorl and the slight tumidity caused by the infra-sutural puckerings; aperture very oblique, round, with a soft pearly nacre all round: outer lip very slightly descending, thick, bevelled outwards to a sharp edge; there is a broad thin hyaline pad spread over the body and connecting the outer lip and the pillar, which is broad, thick, shallowly excavated, with a slight external median horizontal tooth or ridge; the edge is reverted and closely appressed. Alt. ·27, diam. ·25 inch.

350 *fms. in Pteropod ooze, off Culebra Id., W. Indies.*

Operculum small, thin, calcareous, flat, convex on the inside, where it shows 7½ whorls; the last whorl close to its end begins suddenly to enlarge. (*Watson.*)

Although I have above expressed the opinion that this species as well as the following one, is identical with *L. carinata* Cantraine, I have deemed it best to give the original description and figure.

L. ALBIDA Dall, 1881. Pl. 63, fig. 23, 24.

"Shell stout solid, heavy, very nacreous, variable in form and sculpture, rather elevated for the genus, dead white or brownish externally, with the usual solid shelly operculum; whorls 5, rounded, apex obtuse, suture distinct; sculpture of stout revolving ribs varying from three to six on the upper side of the whorl, crossed by slight plications, most noticeable just below the sutures, but distinguishable also on the base; the ribs may be few and widely separated, or numerous and close-set; they may near the sutures be nodu-

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lated by the plications or not. The base is usually more finely sculptured and sometimes quite smooth except for lines of growth." (*Dall.*)

Aperture very oblique, small, its upper margin produced forward and slightly deflected; columella with a stout transverse tubercle about midway its length, and a minute denticle at the point of its junction with the basal lip; parietal wall with a bright white callus.

Alt. 7, diam. 6¾ mill.

Gulf of Mexico (*off Havana, etc.*) 125–1002 *fms.*; *off Cape Hatteras*, 142 *fms.*

Operculum inside pale yellow, multispiral; outside calcareous, polished, white, nearly smooth, showing one whorl with a concentric convexity, much elevated at its termination, central area concave.

"This shell is so variable that I should be disposed to think Watson's *Turbo* (*Collonia*) *indutus* a mere abnormally smooth specimen * * * it is very probable that they will turn out to be varieties of the same species." (*Dall.*)

L. FILIFER Desh., 1863. Pl. 58, figs. 57, 58.

Shell subglobulose, solid, turbinate, perforate, rosy rubescent, variegated with castaneous and white; spire short, obtuse; whorls 5, spirally finely lirate, the last large; base subdepressed; aperture lunate-circular, oblique, pearly within; columella callous below.

Alt. 7, diam. 7 mill.

Mauritius.

L. CICER (Menke) Phil., 1844. Pl. 54, fig. 62.

Shell small, globose-conic, solid, perforate, whitish, tessellated with purple-brown or reddish, the markings usually arranged in regular longitudinal series; spire conic; whorls 4½–5, convex, with moderate sutures, somewhat flattened and sloping around the upper part, spirally coarsely and rather obscurely lirate; aperture oblique, slightly deflected above; columella obsoletely dilated toward the base, umbilicus very narrow; base finely lirate.

Alt. 6–7, diam. 6–7 mill.

Cape of Good Hope.

T. sanguineus Reeve = *T. roseus* Phil. may be synonymous with this species. At any rate no one can tell positively from Reeve's wretched description and figure what form he had before him.

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L. COELATA A. Ad., 1854. Pl. 48, fig. 38.

Shell ovate-conoid, trochiform, thick, slightly elevated, below subdepressed, umbilicate; spire obtuse; whorls 5–6, slightly convex, longitudinally and obliquely striate, spirally granose-lirate; suture impressed; last whorl obtusely angular at the middle, with 16–18 spiral granose liræ, the granules small, close; aperture transversely ovate, silvery within; lip simple; columella narrow, arcuate, thickened at the base; umbilicus deep, with a spiral funicle inside; color reddish yellow. Alt. 11, diam. 16 mill.

Mogador; E. coast Africa.

Operculum calcareous.

This is the *Omphalius coelatus* A. Ad., and the *Turbo MacAndrewi* Mörch, *T. macandrei* Sby. It is the type of *Anadema* A. Ad., proposed as a subgenus of *Omphalius*, and characterized by the spiral funicle within the umbilicus.

L. FRICKII Crosse, 1865. *Unfigured.*

Shell narrowly umbilicated, depressed-turbinate, delphinuliform, somewhat thick, spirally finely striate, bicostate, white, more or less variegated with black; suture subcrenulated; whorls 4, (embryonic 1½ smooth, white), rapidly increasing, subplane at sutures, the last tri-costato-carinate, the costæ articulated with white and black, slightly descending; base somewhat convex, spirally granulose-striate; aperture round, white, scarcely pearly, the basal margin thickened. Alt. 4, diam. 5½ mill.

Gulf of California.

Var. *beta* is gray, obscurely maculated with black.

L. EUCHARIS Crosse, 1865. *Unfigured.*

Shell narrowly perforate, turbinate, delphinuliform, rather thick, dirty white, spirally articulated with black and white, with longitudinal very fine suboblique impressed striæ and spiral costate, the central rib prominent, forming a carina; apex obtuse, subplanulate; whorls 4½, (embryonic 1½ smooth, white, flat,) rapidly increasing, convex, carinate, the last descending; base slightly convex, concentrically costulate and finely radiately striate; aperture round, white, scarcely pearly, basal margin rather wide, subthickened.

Alt. 6½, diam. 5½ mill.

Habitat unknown.

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Operculum calcareous with central nucleus; outside subtly granulose, concave in the center, with two prominent concentric costæ.

A variety has the dark color replaced by scarlet; the spiral costæ are articulated with white and scarlet.

The above two descriptions are derived from the original ones of Crosse.

L. MACULOSA Pease, 1862. Pl. 57, fig. 60.

"Shell small, globose, umbilicate, rather thin, shining, concentrically irregularly ribbed, interstices grooved, concave, transversely very faintly striate, white, ribs spotted remotely with rose red" (*Pease*).

Alt. 2, diam. 1½ mill.

Ins. Paumotus.

To Pease's description of this lovely species, I would add that the spire of adults is more obtuse than his figure, which I have copied, indicates. The altitude is about equal to the diameter; the subsutural rib is frequently nodose; and the umbilicus, as in the following species, is crenated within the margin. It is most nearly allied to *L. picta* Pse.

L. CANDIDA Pease, 1860. Pl. 63, fig. 40.

"Shell minute, thin, perforate, orbicular, ornamented with raised spiral striæ (margins of upper whorls granose at the sutures?) inner lip callous; aperture circular." (Pease).

Sandwich Is.

I have given Sowerby's miserable figure of this species. I have not seen specimens; and so inadequate a description does not deserve recognition.

L. PICTA Pease, 1868. Pl. 69, fig. 35.

Shell small, solid, globose, umbilicate, concentrically ribbed; spire somewhat exserted; whorls angulated at their upper part; aperture circular; columella slightly callous; whitish, striped on the upper part of the whorls longitudinally with reddish brown, below spotted. (*Pease*). Alt. 3, diam. 2½ mill.

Tahiti; Paumotus.

Operculum, pl. 60, fig. 63.

The upper whorls of the spire are granulose above. There is considerable variation in the prominence of the liræ on the central portion of the body-whorl; the margin of the umbilicus is more or less plicate; and the last whorl is slightly deflected toward the aperture.

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L. RUBRICINCTA Mighels, 1845. Pl. 39a, fig. 32.

Shell minute, depressed-globose, perforate; spire short, apex obtuse; whorls 4, convex, encircled by coarse white spiral ribs, the interstices deep red; base smooth, with concentric red stripes; aperture large, rounded, oblique; umbilicus narrow.

Alt. 1½, diam. 1¾ mill. *Hawaiian Is.*

The synonyms are *Turbo multilineata* Garrett, *Collonia rubrilineata* and *C. multistriata* (Pse.) Sowerby, and *Leptothyra rubrilineata* (Garrett) v. Martens.

Some specimens are beaded below the sutures, and there is some variation in the width of the umbilical perforation. The revolving ribs are sometimes obsolete; but so far as I know the red spiral stripes are constant; of these there are usually eight to double that number on the body-whorl.

Mr. Pease distributed this species under the name of "*rubrilineata* Garrett." This fact probably accounts for the names quoted by Sowerby.

L. EXILIS Philippi, (1849?) Pl. 62, figs. 3–5.

"Intermediate between *T. sanguineus* and *T. rubricinctus*, and separated from both by its rather wide umbilicus; there are 4 whorls, which are rapidly increasing and well rounded; the spiral ridges are about 12 on the body-whorl, but vary in number; they are subgranulose, and at the suture distinctly tuberculose. The border of the umbilicus is crenated; aperture circular; color bright carmine, somewhat lighter in the furrows; umbilical tract pure white; aperture inside pale red." Alt. 3½ mill.

Habitat unknown.

This species is unknown to me. The above paragraph contains all the information given by Philippi.

L. VERRUCA Gould, 1845. Pl. 39a, figs. 30, 31.

Shell small, short ovate-conic, solid, imperforate or narrowly umbilicate, white with numerous revolving series of red or brown tessellations; whorls 5, spirally lirate, the liræ largest at middle of whorl, and sometimes causing a slight carina there; last whorl slightly but abruptly deflected anteriorly; aperture circular, white, columella arcuate, wide, white, not dentate below; base with a minute internal denticle. Alt. 5, diam. 5 mill.

Sandwich Is.

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Some specimens are almost entirely red; others are white, with red spots at the periphery. There is some variation in form, also, and in the prominence of the spiral riblets.

Turbo glariosa Gould is a synonym, according to Sowerby. I cannot find that Gould ever described such a species.

An annoying tangle in the synonymy of this species and *L. rubricincta* Migh. resulted from the identification of Gould's *verruca* with Mighel's species by Mr. Pease, and, following him by Von Martens, who figures and describes *rubricincta* Migh., under the name *rubrilineata* Garrett, and *verruca* Gld. under the name *rubricincta* Mighels.

L. ROSEOPUNCTATA Angas, 1880. Pl. 57, figs. 54, 55.

"Shell minute, narrowly and deeply umbilicated, globosely turbinate, solid, white, more or less dotted or flamed all over with bright rose color; whorls 4, convex, closely concentrically ridged throughout; aperture subcircular; peritreme a little thickened and contracted." (*Angas*). Alt. 2½, diam. 3½ mill.

Holdfast Bay, St. Vincents Gulf, Australia, (in shell sand).

L. PILULA Dunker, 1860. Pl. 58, fig. 59.

Shell small, globose-conic, umbilicate, solid, dirty white, obscurely radiately maculated and spotted above and banded below with dull purplish brown; spire short, conic; whorls 4, the apical one almost flat, the last *not deflected anteriorly*, spirally lirate, the lirae about 25 in number, unequal, finely transversely striate; *aperture subvertical*, circular, peritreme thick; columella excavated at the deep umbilicus, which bears internally a spiral callous rib; margin of umbilicus crenulate or plicate. Alt. 4½, diam. 5–6 mill.

Japan.

Cymisca japonica A. Ad., is synonymous. It is also the *T. (Collonia) pillula* of Sowerby. Described originally as a *Liotia*.

L. LÆTA Montrouzier, 1863. Pl. 63, figs. 29, 30.

Shell small, umbilicate, subconoid-globose, solid, spirally unequally lirate, upper whorls granulate and base sometimes slightly so, dull white, maculate, generally flammulate above with chestnut, irregularly spotted below; spire short, apex obtuse; whorls 4, suture impressed, the last whorl briefly deflexed anteriorly; aperture rounded, oblique, in adults *crenulated within;* columella excavated at the narrow deep umbilicus. Alt. 4½, diam. 5 mill.

New Caledonian Archipelago; Viti and Solomon Is., Australia.

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Operculum (pl. 60, fig. 65) inside yellowish, multispiral, nucleus somewhat excentric; outside calcareous, white, concentrically coarsely striate and radiately marked, except on margin of increment, which is smooth and elevated; center subconcave and coarsely granulose.

The synonyms are *T. costulosus* Sowb., *T. costulatus* ("Gld") Sowb., and *Trochus (Gibbula) supragranosus* E. A. Smith.

A well marked form, of wide distribution, of which I have before me many examples, all agreeing in the peculiar operculum. I cannot follow Sowerby's synonymy in this group; he seems to have united species from a mere superficial likeness. Here, as in the typical *Turbo* and *Astralium*, the characters derived from the opercula are of high specific value, and this organ should be examined before uniting the numerous described species.

L. NANINA Sowerbie, 1864. Pl. 58, figs. 55, 56.

Shell minute, umbilicate, suborbicular; apex obtuse; spirally impressed-striate; apex, subsutural tract and base with impressed radiating striæ; white, marked around the periphery with rosy equally spaced spots; whorls 5, convex; aperture rounded; columella thickened; umbilicus narrow, deep, rounded, radiately plicate on the edge. Alt. 3, diam. 3 mill.

Ins. Art, Archipelago of N. Caledonia.

Evidently closely allied to *L. læta*. Operculum unknown.

L. GRANULOSA Pease, 1868. Pl. 57, fig. 59.

Shell small, solid, umbilicate, depressed orbicular, spire but slightly exserted, very obtuse; whorls 4, the first planorboid, upper ones granulose, the last spirally lirate, the liræ about 25 in number, unequal; aperture subcircular, deflected above; umbilicus plicate within; color whitish, painted with broad radiating stripes and spots of reddish brown; white around the umbilicus.

Alt. 3½, diam. 4 mill.

Ins. Ponape.

The spire is usually slightly shorter than in the figure.

The aperture does not show the minute liræ within its outer margin, and teeth within the base which are found in *L. læta*, and is smaller and more oblique than in *L. pilula*.

L. FLUCTUATA Hutton, 1884. Pl. 64, figs. 47, 48.

Shell small, rather solid, spirally striated, not iridescent; color yellowish white or pale brownish, with irregular waved longitudinal

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bands of brown which are rather indistinct; spire depressed, obtuse; whorls 4, rounded, distinctly and closely spirally grooved, the umbilical region smooth [or finely lirate]; suture scarcely impressed; umbilicus narrow, deep; aperture subrotund; peristome acute, not continuous, the lower lip thickened. (*Hutton.*)

Alt. 2¼, diam. 3 mill.

Foveaux Straits.

Operculum inside as usual in the genus, showing about 6 closely-coiled whorls; outside subvitreous and translucent, nearly smooth, calcareous, slightly concave in the center.

It is *Cyclostrema fluctuata* Hutton.

Separated from *L. læta* by the lack of spiral sculpture on the operculum and the somewhat smaller size. My figures are from specimens received from the author.

L. PUSIO (Anton) Phil., (1849?) Pl. 44, fig. 70.

Shell minute, globose-conoid, narrowly umbilicate, yellowish, maculated and spotted with clear and dark brown flecks; whorls 5, the last with about sixteen, penultimate with six to eight spiral liræ, which are as broad as their interstices; umbilicus with crenate margin; aperture circular, very smooth within.

Alt. 4½, diam. 5 mill.

Habitat unknown.

I am unable to satisfactorily identify this form with any other known to me. Its sculpture and smooth aperture separate it from *L. lata* Montrouzier.

L. CALIFORNICA (Troschel) Phil., (1849?). Pl. 58, figs. 53, 54.

Shell small, perforate, globose-conoid, very solid, white, variegated with purplish; whorls 4, the last very closely transversely striate and obsoletely transversely costate; aperture orbicular; lip inside densely crenulated. (*Philippi.*) Alt. 5, diam. 6 mill.

"California" (*Philippi.*)

This species is apparently very nearly related to the *T. sanguincus* L., but is distinguished by the crowded transverse striæ of the upper surface, by the narrowly but conspicuously umbilicate base, by the plicæ within the outer lip, and finally by the coloration, which consists of large deep-red maculations above at the suture and in the middle of the lower side, and smaller paler flecks around the umbilicus and at the periphery. I see no tubercle upon the columella. (*Philippi.*)

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Von Martens (Nachrichtsbl. d. Mal. Gesell., 1878, p. 38,) considers this species the same as *Leptothyra sanguinea* Carp. (*non* Linn.) = *L. carpenteri* Pilsbry. The above description, translated from the original one of Philippi, shows it to belong to an entirely different group of species—that of *L. læta* Montrouzier; and it may indeed be nothing more than a bright colored example of that species. At all events, nothing of the sort has been found upon the Californian coast.

L. MUNDA A. Ad., 1873. Pl. 57, fig. 53.

Shell depressed turbinate, solid, narrowly umbilicate, white, strigate and maculate with pale fulvous; whorls 4, convex, angulate above, finely striate, spirally lirate, the liræ larger at periphery; aperture circular, peristome varicose, deeply crenate; base slightly convex; umbilicus with a crenulate margin.

Alt. 4, diam. 4 mill.

Persian Gulf.

I have not seen this species. It is apparently related to the following.

L. ARSINOENSIS Issel, 1869. Pl. 58, fig. 61.

Shell small, rather solid, orbicular conoid, depressed, narrowly perforate, white, granulose above; spire very obtuse, apex planulate; suture slightly impressed; whorls 3½, the last angulate, encircled by three conspicuous costæ; base minutely concentrically costulate; aperture subrotund, right margin arcuate, acute, columella nearly straight, much thickened; umbilicus narrow, nearly closed, bounded by a crenulated margin. Alt. 1½, diam. 2¼ mill.

Red Sea.

My description is taken from Issel. He says: "Of this species I have seen but a single subfossil example."

L. EROOPOLITANA. Issel, 1869. Pl. 58, fig. 60.

Shell small, somewhat solid, orbicular-conoid, subperforate, white, with very fine elevated longitudinal striæ; spirally costulate; apex obtuse; whorls 4, rapidly increasing, angulate above, separated by a distinct suture, the last with three spiral liræ, obscurely angulate at base; aperture subtetragonal, over half the length of shell; base slightly convex, concentrically cingulate; operculum white, calcareous, convex outside. Alt. 2½, diam. 2½ mill.

Suez.

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encircled by minutely granulose liræ, with smaller ones intercalated; three first whorls but little projecting, the fourth double the length of the first three, the last inflated; penultimate and last whorls with a median series of reddish-brown quadrangular maculations or with the spiral liræ articulated with brown; beneath with a less obvious zone of the same color; spiral liræ 7 to 8 on the penultimate, 15 on the last whorl; outer lip acute, slightly sulcate, with dots of carmine; inner lip arcuate, reflexed, planate; aperture subrotund, pearly; operculum calcareous, pearly. Alt, 11, diam. 10 mill. (*Caramagna.*)

Red Sea at Assab.

Collonia gestroi Caramagna, *Bull. Soc. Mal. Ital.*, xiii, 1888, p. 132 t. 8, f. 10, 10a.

Compare *Turbo pustulatus* Brocchi, a species with which *L. gestroi* may possibly prove synomymous.

L. PYROPUS Reeve, 1848. Pl. 44, fig. 67.

Shell somewhat depressly ovate, imperforated, sutures of the spire simple, whorls smooth, spirally encircled with striæ; whitish, lines bright red, interior silvered. (*Reeve.*)

Habitat unknown.

Known to me only by Reeve's description and figure. It may not be a *Leptothyra*.

***

Doubtful, undetermined and spurious species of Leptothyra.

A portion of the following species can be determined by an inspection of the type specimens, in those cases where they can be found. The others or all of them, perhaps, had better be ignored. I have given the original descriptions.

T. (COLLONIA) MARMOREUS ("Pease") Sowerby, 1886. Pl. 69, fig. 25.

Testa minuta, ovata, imperforate, alba, pallide fusco-marmorata; spire parva; anfr. convexo-declives, ultimus leviter elevatus, infra medium obtuse angulatus; apertura oblique ovata. (*Sowerby.*)

Sandwich Is.?

Said to be in the British Museum under the above name. The figure is from Sowerby.

L. COSTATA Pease, 1869.

Shell thick, solid, turbinate, narrowly perforate; whorls 4, transversely ribbed, angulate at the middle, ribs largest at the angulation

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and below, longitudinally finely striate; aperture somewhat oblique, nearly circular; mottled and spotted with white black and brown, apex white.

Alt. 3, diam. 3½ mill. (*Pease.*) *Ins. Maui.*

TURBO MURREUS Reeve, 1848. Pl. 58, fig. 62.

Shell minute, somewhat orbicular, slightly umbilicated, smooth, polished, white neatly blotched with pale rose. (*Reeve*).

Habitat unknown.

"A minute delicately colored porcelain shell." (*Reeve.*)

TURBO (?) PULCHELLUS C. B. Ad., 1845.

Testa minina, albida, maculis rubris quadratis inequalibus, majoribus nigrescentibus, serie decurrentibus depositus, ornata; sutura profunda; anfr. 5, mediis carinatis, lineis elevatis pluribus decurrentibus instructis; labro tenui; umbilico nullo. Alt. 1·65, diam. ·1 inch: divergence of spire, 45°. (*Adams.*)

Jamaica.

COLLONIA STRIATA Gray, 1850. *Unfigured.*

"Shell red, white-marbled, striated. (*Gray.*) *Africa.*"

TURBO (COLLONIA) SQUAMATUS (A. Ad.) Sowerby, 1886. Pl. 44, figs. 66, 66a.

Testa ovato-conica, tenuiscula, imperforata, sordida; spira acutiuscula; anfr. 5, superne concavo declives, deinde obtuse angulati, spiraliter lirati, utrinque spiraliter minute striati, et striis obliquis minutissime squamatis sculpti; anfr. ultimus ad peripheram angulatus; apertura parviuscula, subcircularis. Specimens in British Museum with name by A. Adams, but he does not seem to have published any description of the species. (*Sowerby.*)

Habitat unknown.

T. (COLLONIA) ARMILLATUS (A. Ad.) Sowerby, 1886.

Testa suborbicularis, imperforata, albida, flammulis obliquis angustis rubro-fuscus ornata; spira depressiuscula; anfr. rotundati, costis latiusculis confertis subplanulatis spiraliter cingulati. (*Sowerby.*)

Australia.

Sowerby's figure of this species is reversed and wholly unrecognizable.

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COLLONIA LENTICULA Gould, 1861.

Testa minuta, solida, alba, globoso-leuticularis, ubique striis confertis tenuissimus cincta; anfr. 4, depresso-convexis, cito crescentibus; basi convexo, imperforato, callo copioso munito; apertura parva, circularis. Diam. 4, alt. 2 mill. (*Gould.*)

Chinese Seas.

COLLONIA QUANTILLA Gould, 1861.

Testa minuta, solida, depresso-orbicularis, rosacea, sulcis pallidioribus circ. 4 cincta; anfr. 4, vix convexis, peripheria obtusa; basi convexo, pallidiore, arcte perforato; apertura circularis; labro crasso; columella robusta declivi. Diam. 3, alt 2 + mill. (*Gould.*)

Simon's Bay.

TURBO NOCTURNUS Gould, 1861.

Testa parvula, globoso-conica, solida, rufo-fuscescente et rosaceo alternatim strigata; apice albo; anfr. 5, convexis, sulcis equalibus aratis; sutura impressa; basi convexo, imperforato, concentrice striato; apertura subcircularis; columella expansa, argentata, granulata, extus erecta. Operculum osseum, pauci-spirale, apice excentrico, extus granulato. Alt. 7 mill. (*Gould.*)

Simoda, Japan.

Evidently not a *Leptothyra*. Sowerby considers *Collonia variegata* A. Ad. a synonym; and gives a figure of a *Leptothyra*. which might represent almost anything in the genus; but which, together with his description, certainly has nothing to do with Gould's species.

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Family TROCHIDÆ.

Sub-family DELPHINULINÆ.

Shell turbinate or subdiscoidal, umbilicate, solid, pearly within whorls loosely coiled, the last frequently free from the preceding, more or less angulated, rudely spirally lirate, scaly or spinose; aperture circular, peristome sinuous on the columellar margin, acute, often slightly produced or subrostrate below. Operculum thin, corneous, multispiral.

Animal with large foot; epipodial line bearing cirri; without inter-tentacular lobes; eyes on short peduncles at the outer bases of the tentacles; tentacles long, slender; mouth provided with jaws; radula with the formula ∞ . 5–1–5 . ∞, the central tooth broader than long, with a broadly reflected simple cusp, lateral teeth with cusps, the two outer very large; marginals with short simple cusps, the outermost with serrate cusps.

The relations and limits of this subfamily will be more fully considered in the monograph of the *Trochidæ* in the next volume of the MANUAL.

Synopsis of recent Genera.

Genus DELPHINULA Lamarck, 1803.

Shell rather large, solid, umbilicated, turbinate, the upper whorls flattened, the last descending, rudely spinose or scaly, more or less carinated, but slightly in contact with the preceding; aperture circular; peristome usually somewhat produced at base.

Angaria (Bolt. 1798) H. & A. Adams, 1858, is a synomyn.

In this genus were formerly included the species now classed in *Liotia*, *Collonia* and some other genera.

Subgenus ANGARINA Bayle, 1878.

Shell depressed, discoidal, sinistral (?), widely umbilicate, spirally lirate, aperture rounded; umbilical area bounded by a series of spines. Animal and operculum unknown. *Delphinulopsis* Wright, 1878, (preoc.) is synomymous. Probably not a valid genus.

Genus DELPHINULA, Lam., 1803.

D. LACINIATA Lamarck, 1819. Pl. 67, figs. 1, 2, 4.

Shell depressed-turbinate or nearly planorboid, solid, heavy, umbilicate; whorls 4½, the inner ones planulate, planorboid, apex

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minute; body-whorl descending, frequently free or nearly free from the preceding, in section subtriangular, angled below and less conspicuously so at the shoulder; all over finely spirally lirate, the liræ either smooth, densely squamose or spinose; periphery bearing large irregular more or less hollow foliated processes, which droop foreward or downward; one or two series of smaller spines usually revolve about the middle of the last whorl; base carinated, the carina usually nodose or irregular, bounding a circumumbilical tract usually acutely squamose; the umbilicus proper is narrow and deep; aperture rounded trigonal, inside perfectly circular, pearly, white or tinged with golden; peristome irregular, acute, the columellar margin sinuous, the base more or less produced. Color whitish, pink or yellowish, the projecting processes and spinelets often redder or blackish.

Alt. 55, diam. 70 mill.; alt. 35, diam. 55 mill.

Indian O.; E. Indies; Philippines; Mergui Archipelago, etc.

The following are synonyms: *D. delphinulus* Linn., *D. formosa* Rve. (pl. 65, fig. 9, 11; pl. 67, fig. 3), *D. incisa* Reeve (pl. 66, fig. 16), *D. nodosa* Rve. (pl. 66, fig. 18), *D. nodulosa* (Gm.) Phil. *D. aculeata* Rve. (pl. 66, fig. 14) and *D. curacanthra* A. Ad. (pl. 66, fig. 17) are forms intermediate between the type and var. *melanacantha*.

Turbo delphinulus of Linnæus, was undoubtedly the first binomial name applied to this form; but since it has been ignored by authors for more than a century, science would probably not be benefitted by an attempt to revive it.

The variation in form, sculpture and color in *Delphinula* is very great. I am unable to distinguish the numerous species described by Reeve. The last whorl, in *D. laciniata*, may be deeply descending, almost or quite free from the preceding at the aperture, or it may be but slightly descending, nearly planorboid. Its upper surface is plane or very obscurely radiately undulate. The peripheral spines in the typical form defined above, are large, foliated, and drooping; but are nearly as frequently narrow and subsimple. The following varieties may, when typically developed, be distinguished; but the transition forms are more numerous in collections than the typical ones.

Var. ATRATA Reeve, 1842. Pl. 66, fig. 15.

Differs from the type in having the superior series of foliations or spines less conspicuous and those upon the middle and base of the whorl numerous and more developed; peristome pink-margined within; ground-color pink or grayish, liræ and spines black.

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Delphinus decrepitus and *Delphinus atratus* Chemnitz are identical with this species.

D. martinii A. Adams, (pl. 66, fig. 19) from *Padang* differs only in the color. The spines are red or purplish on a pink ground.

Var. MELANACANTHA Reeve, 1842. Pl. 65, figs. 6, 7.

Whorls rounder, less carinated below than in the type; surmounted by a corona of slender long radiating or ascending spines; umbilicus wider.

D. imperialis Reeve and *D. distorta* Kiener (not Lam. nor Linn.) are synonymous.

D. SPHÆRULA Kiener. Pl. 67, fig. 5; pl. 68, fig. 20.

I know this form only by the description and figures given by Kiener. The latter are copied on my plates. In the simple, apparently very regular spines, the form is different from any specimens I have seen.

Indian Ocean.

D. DISTORTA Linn, 1758. Pl. 65, fig. 8; Pl, 68, figs. 12, 13.

In general form similar to *D. laciniata.* *Upper surface of whorls radiately conspicuously plicate*, the folds terminating in solid knobs or short spines at the carina; liræ rather coarser than in *laciniata;* base of body-whorl rounded or only obtusely carinated; the sculpture and color of the umbilical area not notably different from that of the whorl outside; color white or pink, *the liræ, spines and scales deep crimson;* size smaller than *laciniata.* Alt. 30, diam. 40 mill. or less.

Indian O; Nicobar Is., etc.

This is the *Turbo distortus* of Linn., *Delphinula distorta* Lam., and *D. rugosa* of Kiener's plates.

As far as my material allows me to judge, this form does not intergrade with *D. laciniata.*

D. TYRIA Reeve, 1842. Pl. 66, figs. 12, 13.

In general form like *D. laciniata.* Whorls angulate at the shoulder, rounded or obtusely angular around the umbilicus, covered all over with densely and acutely squamose liræ; upper surface of whorls plane or gently radiately undulating; color white, the umbilical region and a subsutural spiral band, deep purple or purplish crimson. Alt. 45, diam. 50 mill.

Australia.

The fine uniformly scaled sculpture will distinguish this beautiful species.

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* * *

D. NITIDA Verrill and Smith, 1885. Pl. 65, fig. 10.

Shell small, fragile, very delicate, with a slight silvery iridescence. Our specimen which has lost the apex, consists of 3 gradually enlarging whorls, entirely disconnected with each other and nearly round in a cross section. When perfect the spire must have been rather elevated, gradually tapering to an acute tip. The surface is sculptured by thin elevated riblets, crossed by distinctly raised revolving lines of about the same size, producing a pretty regularly cancellated or reticulated sculpture, in which the meshes are mostly elongated in the direction of the spire around the periphery, but in the opposite direction on the lateral and inner surfaces; the transverse riblets are most elevated on the upper sides of the whorls, where they rise into small thin lamellæ; they also form similar lamellæ on the inner and lower surfaces; the revolving lines are most conspicuous around the periphery; minute but distinctly raised lines of growth also cross the intervals between the riblets. In a front view of the base the shell appears umbilicated, and the upper whorls can be partially seen within the umbilicus. Color silvery white, slightly iridescent. Alt. (of last three whorls) 5, diam. 4 mill.; diam. of aperture, 1·6 mill. (*Verrill.*)

Off Chesapeake Bay, in 1423 fms.

Animal unknown. The systematic position of this form is uncertain; but the pearly structure of the shell indicates, as Verrill observes, that it belongs in the vicinity of *Delphinula*, although not I believe, strictly speaking, to that genus.

Subgenus ANGARINA Bayle, 1878.

A. LESOURDI B. Wright, 1878. Pl. 68, figs. 6-8.

Sinistral, profoundly perviously umbilicate, depressed, suborbicular, somewhat solid, transversely costate lirate, pale greenish, maculated with chestnut; spire plane, suture profoundly impressed, broadly canaliculate; whorls remaining 4½, (the apex wanting,) spirally lirate, the costæ about 14 in number; base bearing a series of short spines; umbilical area white within; aperture round, pearly within, peristome simple, the columellar margin subexpanded.

Diam. 41, alt. 24 mill.

Japan.

Described from a single young specimen, which has every appearance of being abnormal. Fischer surmises that the shell is really

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dextral, instead of sinistral, as described by Wright, the spire immersed, forming a false umbilicus. Von Martens suggests that it is a distorted *Turbo*. Compare the sculpture with that of *Turbo cornutus*.

APPENDIX.

NERITINA, subgenus CLITHON Montf., p, 63.

N. NORDQUISTI Westerlund, 1887. Pl. 68, figs. 9-11.

Ovate, semiglobose, closely striate, with incremental wrinkles, densely covered with spiral lines; black or rarely brownish-olive, concolored or painted with numerous black points in transverse series, black rhomboidal reticulations, or variously marked with pale yellow; spire prominent but nearly always eroded; body-whorl strongly depressed, subconcave at the suture; suture appressed, anteriorly subdescending; aperture bluish within, angular above; outer lip slightly curved, basal margin arcuate, columella slightly sinuous, obtusely denticulate, columellar area grayish yellow, finely rugose and foveolate, its superior portion brown, shining, punctate.

Alt. 21, diam. 15 mill.

Japan.

PHASIANELLA, subgenus ORTHOMESUS, Pilsbry.

P. SPLENDIDA Philippi, 1849. Pl. 39a, fig. 5.

This form I inadvertently placed in the synomymy of *P. variegata* Lam. (p. 179). It seems to be quite distinct from that species. I translate Philippi's description, which applies perfectly to the specimens before me.

"Shell ovate-oblong, conoid, very thin, very smooth and shining, olivaceous, sometimes varied by narrow milk-white flammules marked with transverse red lines articulated with white dots; aperture ovate, longer than the spire.

"The shell is long-oval, conoidal, thin, very smooth and very shining. The whorls seven in number, are moderately convex The last occupies more than half the entire altitude. The two embryonic whorls are milk-white, and form a blunt apex. The aperature is rather broadly ovate. The color is olive-brown, verging on red, sometimes with narrow milk-white flammules, always with evenly spaced red spiral lines, which are regularly interrupted by milk-

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white points, and which are visible within the aperture. (*Philippi, in Küst. Conch. Cab., ii, p.* 8.) Alt. 10, diam. 7 mill.

Red Sea.

P. brongniarti Audonin is a synomym of this form, not of *P. variegata.*

I neglected to state in the text that fine spiral capillary lines upon the shell are characteristic of the species of *Orthomesus*, but are not found upon the true *Phasianella* nor on *Tricolia.* Variable as is the coloration of shells of this family generally, these fine lines seem to be most constant.

P. MARMORATA Dufo. p. 183.

I have identified with this form a series of shells from the *Seychelles* which I have received, but, unfortunately, too late to figure it in this volume of the MANUAL. The locality should read, *Seychelles and Amirante Is.*

TURBO.

T. MAGNIFICUS Jonas. p. 192.

The figure given on pl. 40, does not show the characters of this species as well as is desirable. The original figure given by Philippi is copied on pl. 69, fig. 21.

T. MILITARIS Reeve, 1848. Pl. 69, fig. 31.

The figure of this species in the *Iconica* led me to believe it a form of *T. petholatus.* If Sowerby's figure, copied on my pl. 69, fig. 28, really belongs to *militaris*, I am inclined to think it distinct. Fig. 29 is a copy of the original one of Reeve.

P. 191, seventh line from bottom, read SENECTUS (*Humph.*) *H. and A. Adams*, not SENECTUS (*Humph.*) *Swainson.* The latter author applied this name to the typical *Turbo.*

T. LAJONKAIRII Desh., p. 199. *Delphinula ducalis* Phil. is a synonym.

T. HISTRIO Rve., p. 201. This species was collected by the 'Alert' at *African and Darros Is., Amirante group.*

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INDEX AND SYNONYMY.

PHASIANELLINÆ, TURBININÆ, DELPHINULINÆ.

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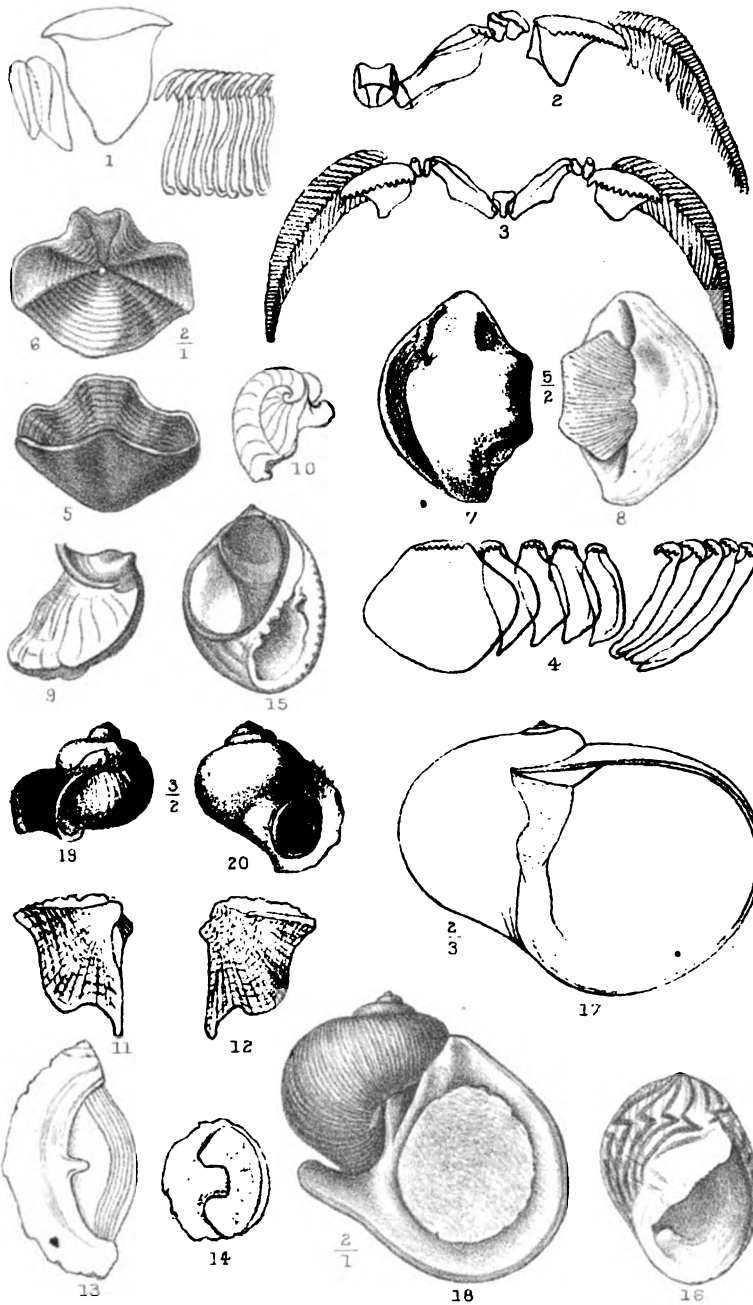

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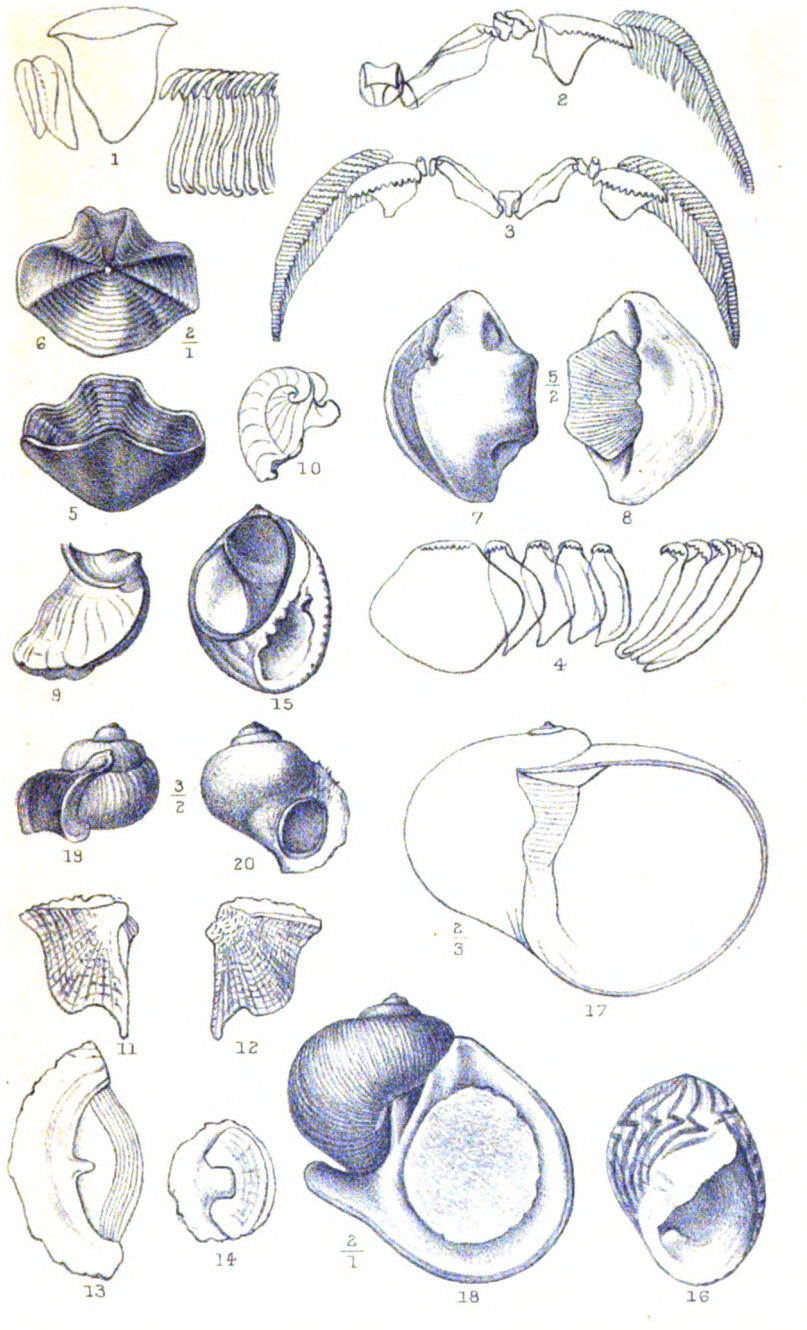

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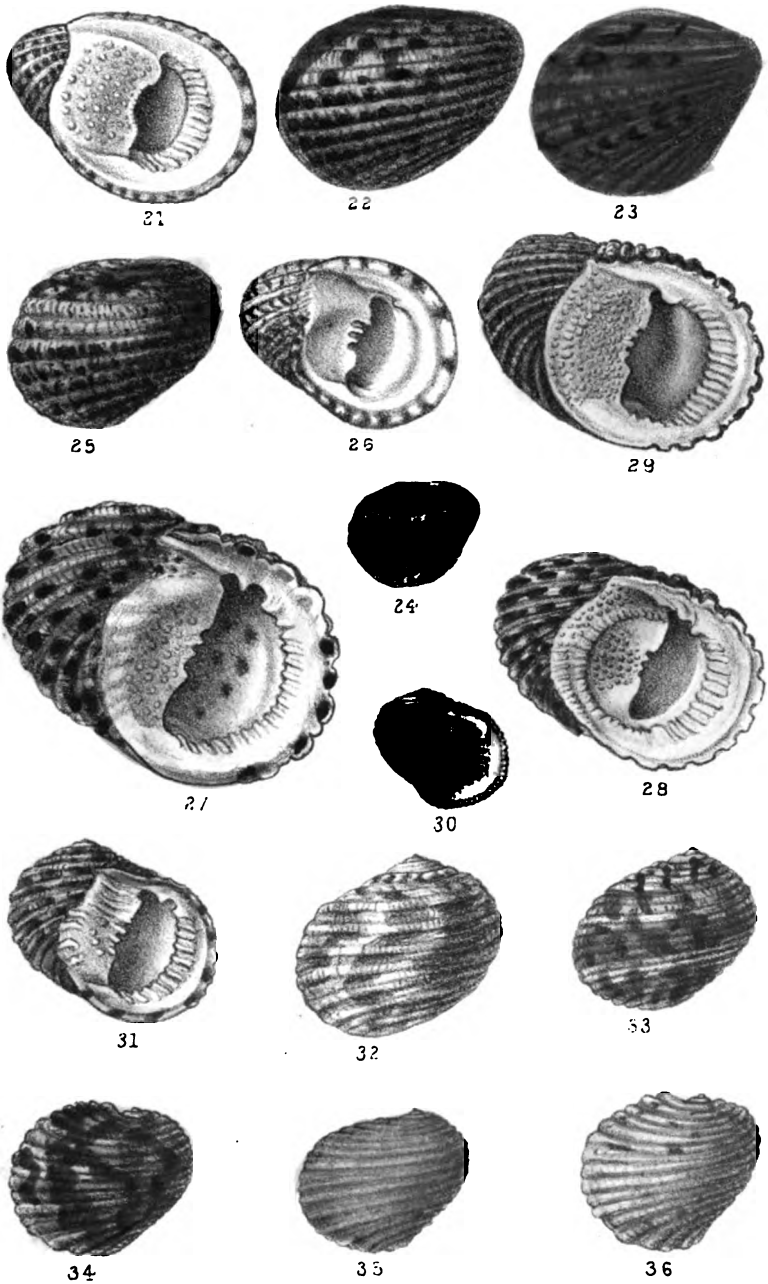

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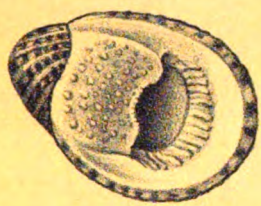
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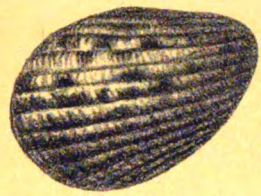
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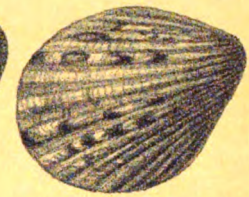
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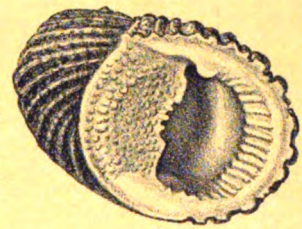
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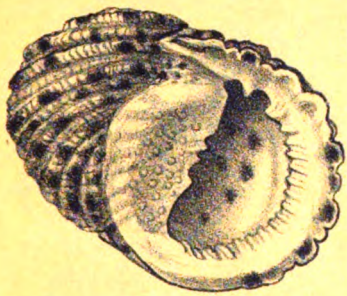
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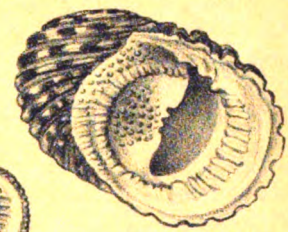
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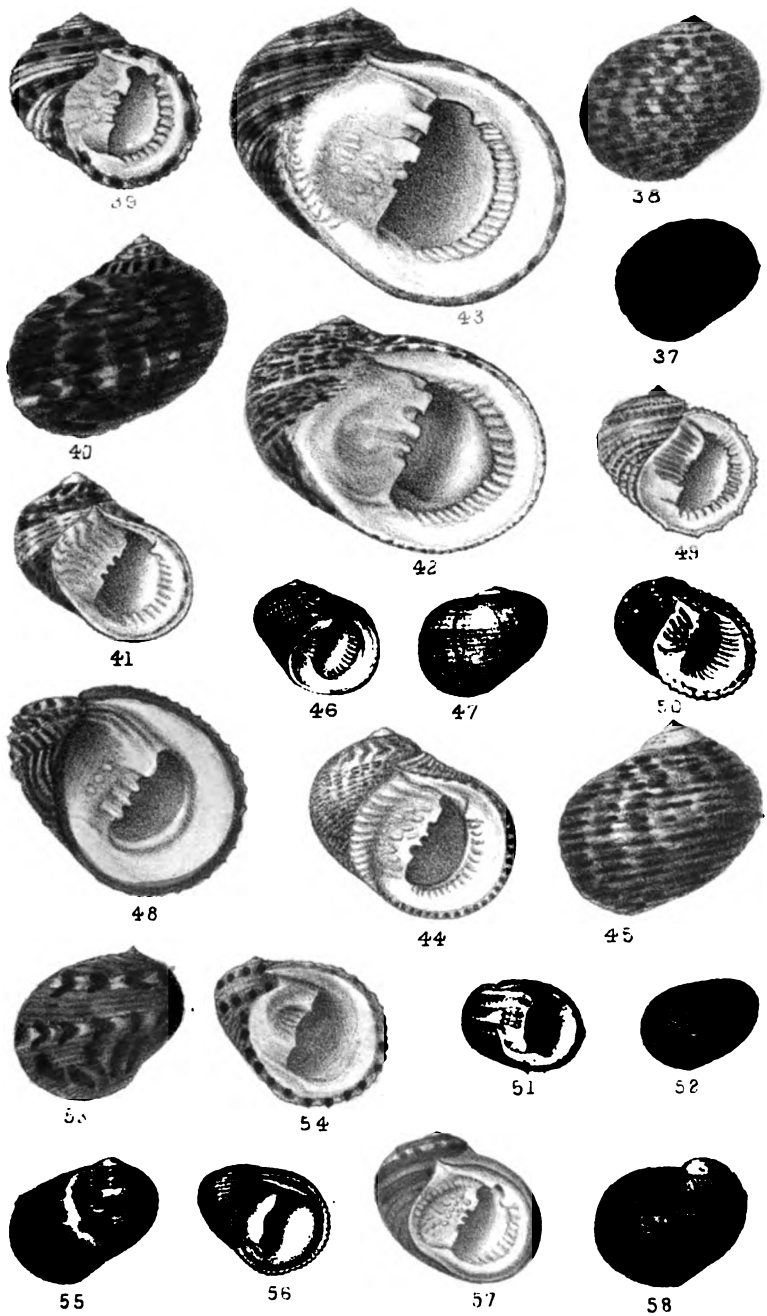

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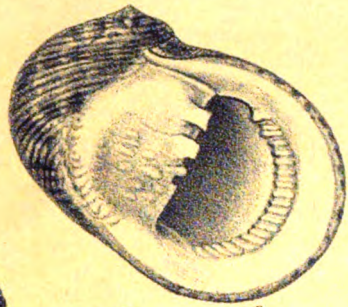
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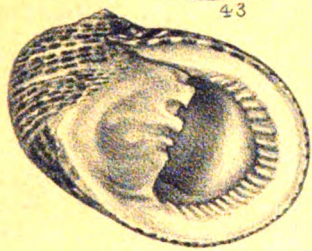
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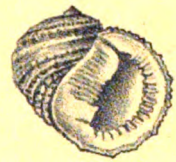
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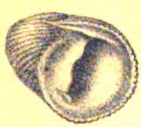
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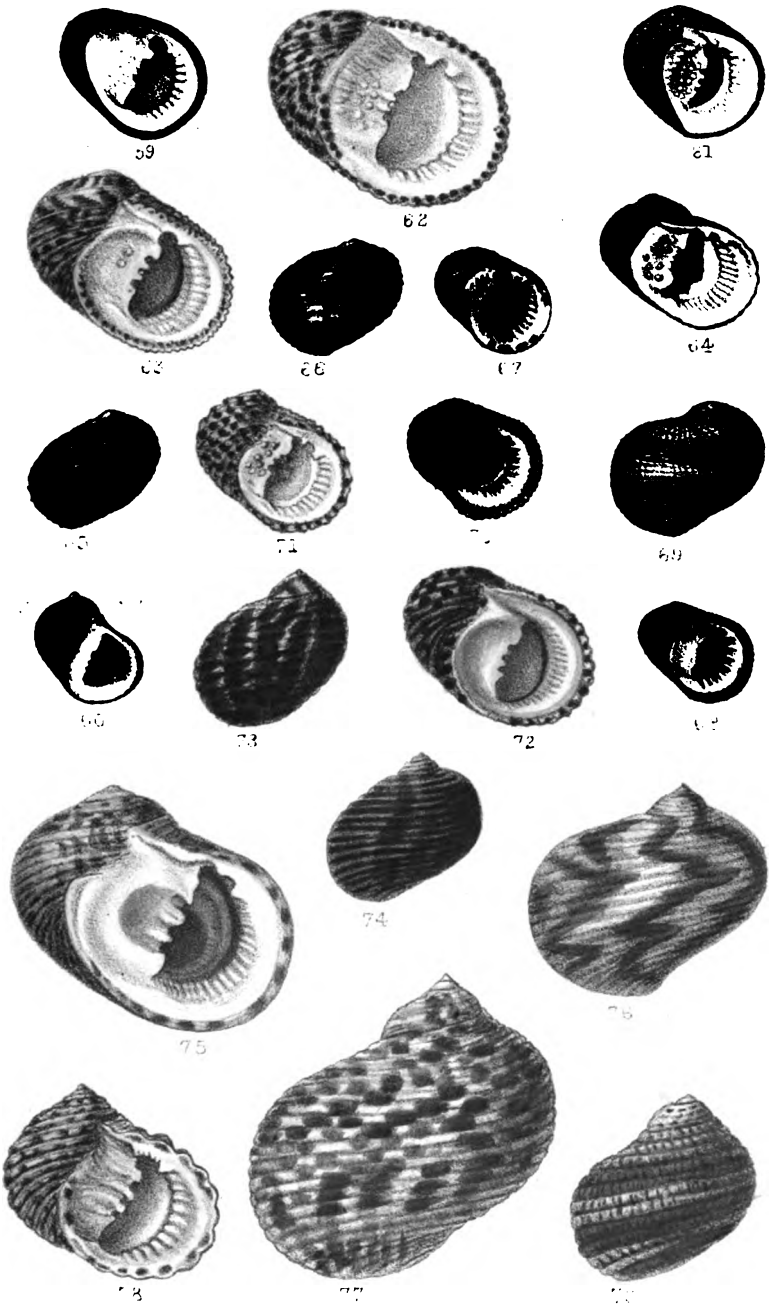

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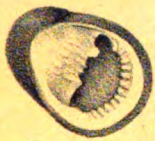
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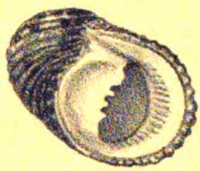
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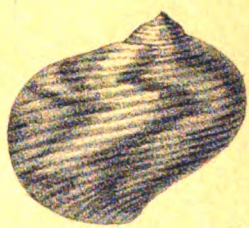
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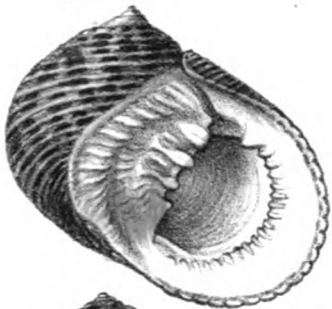
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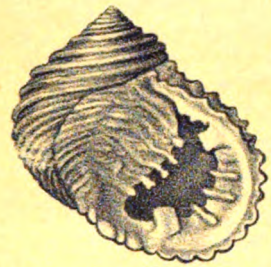
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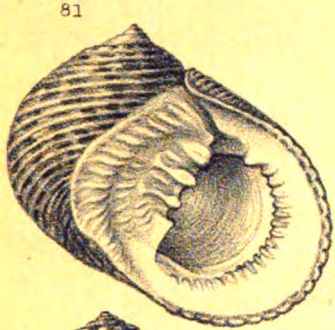
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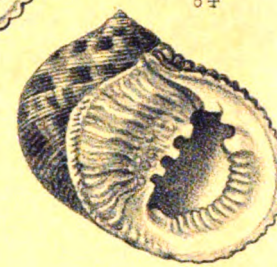
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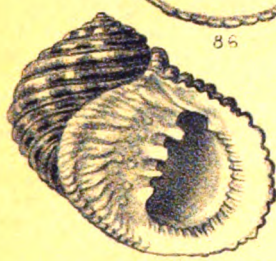
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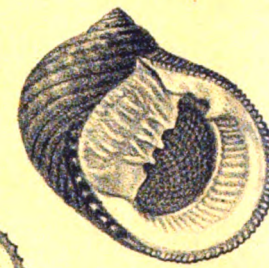
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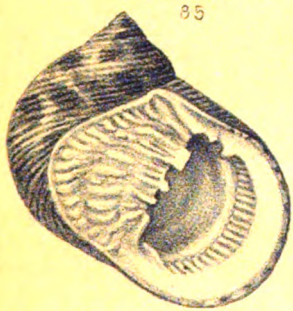
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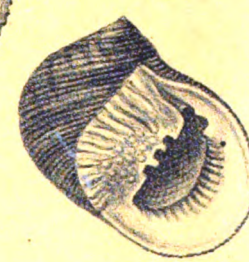
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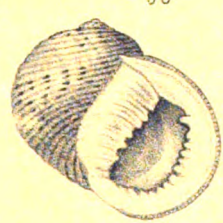
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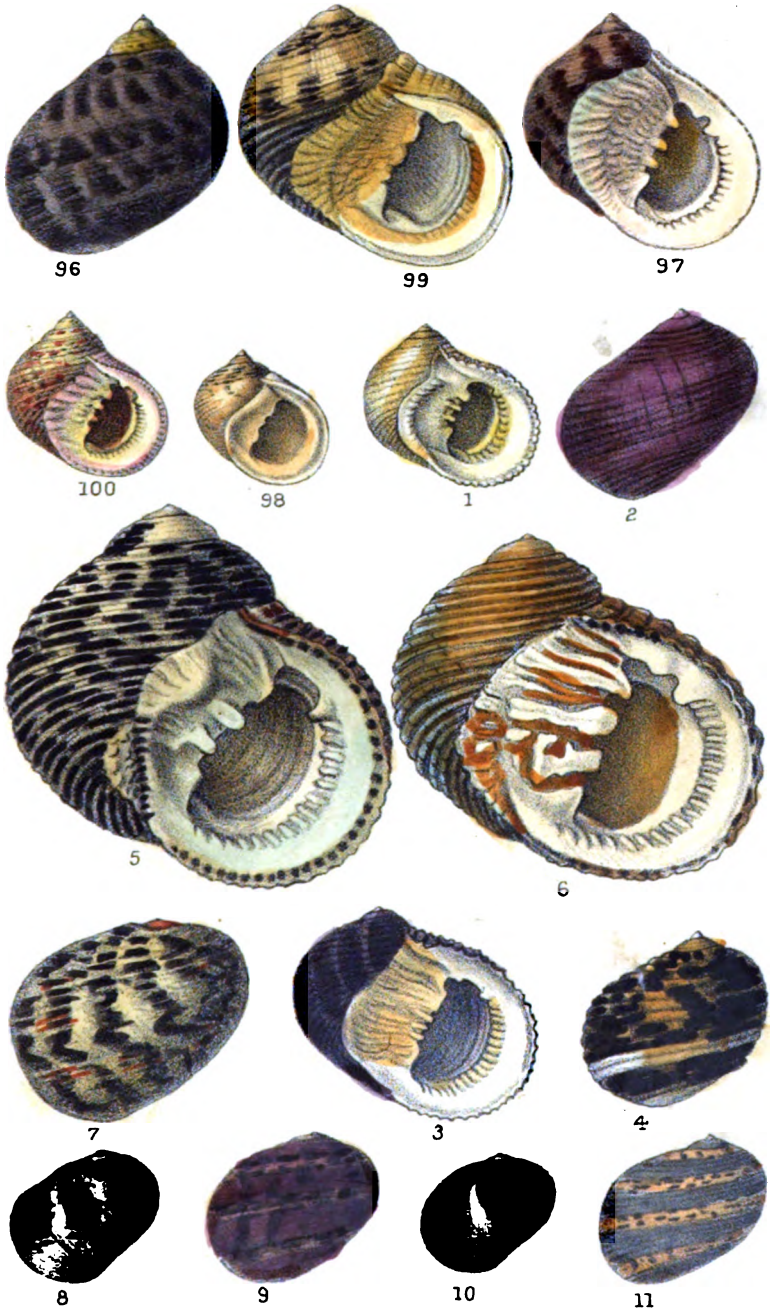

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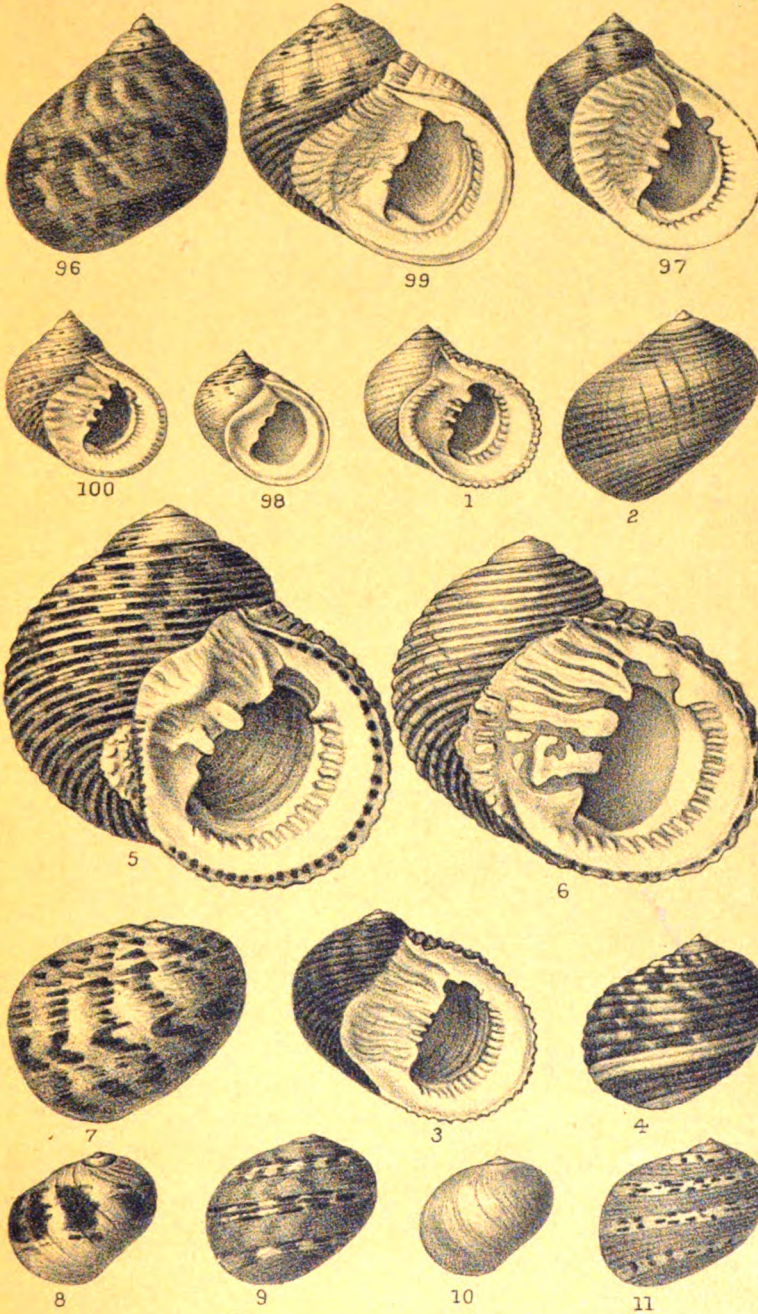

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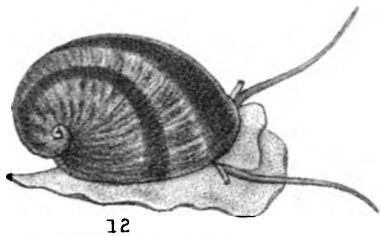
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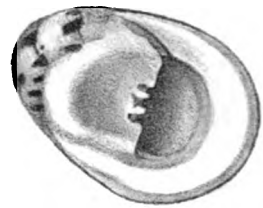
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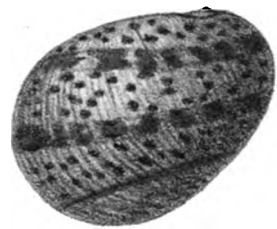
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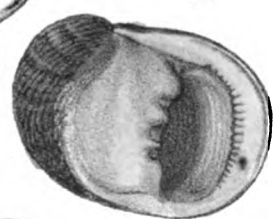
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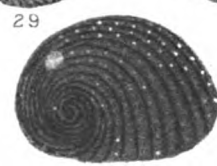
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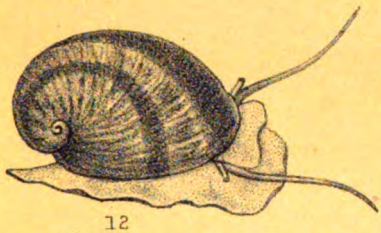
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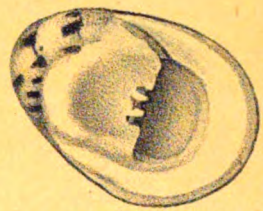
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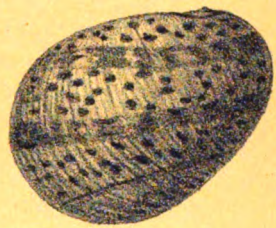
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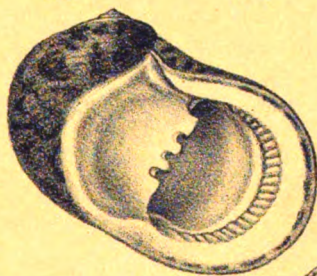
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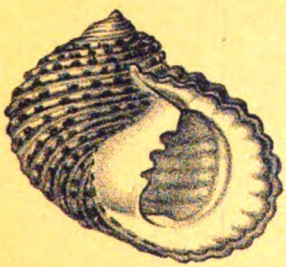
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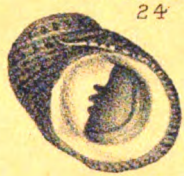
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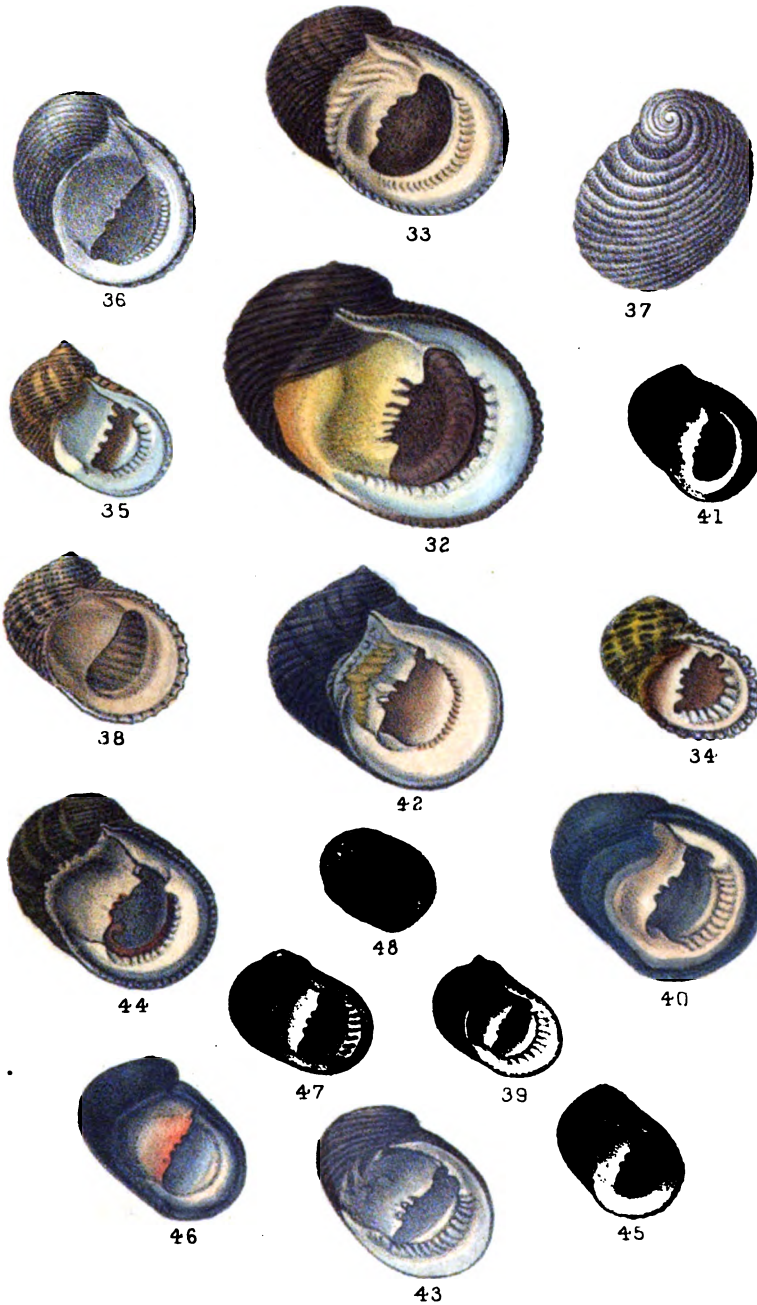

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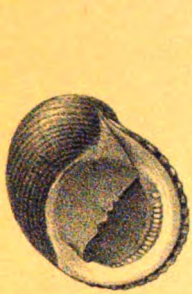
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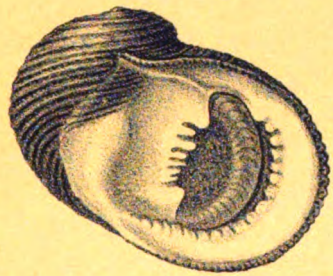
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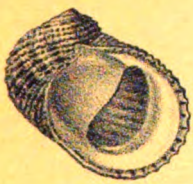
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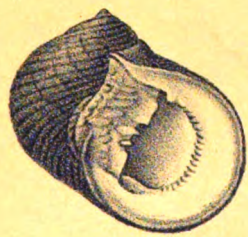
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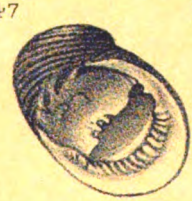
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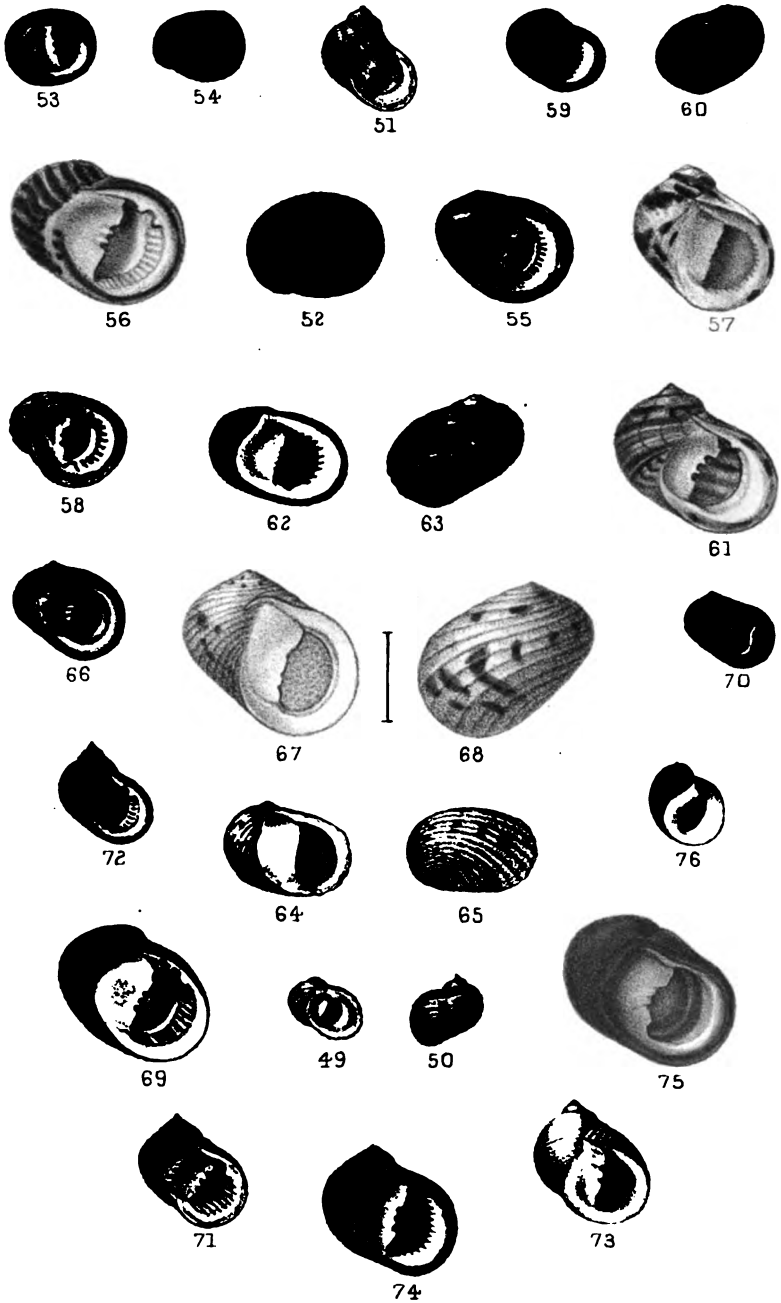

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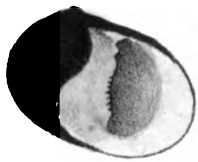
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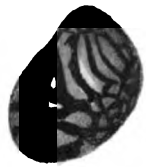
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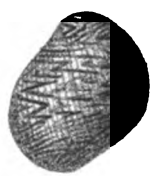
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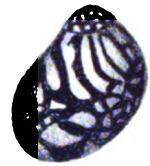
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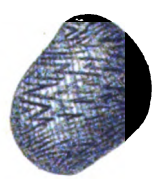
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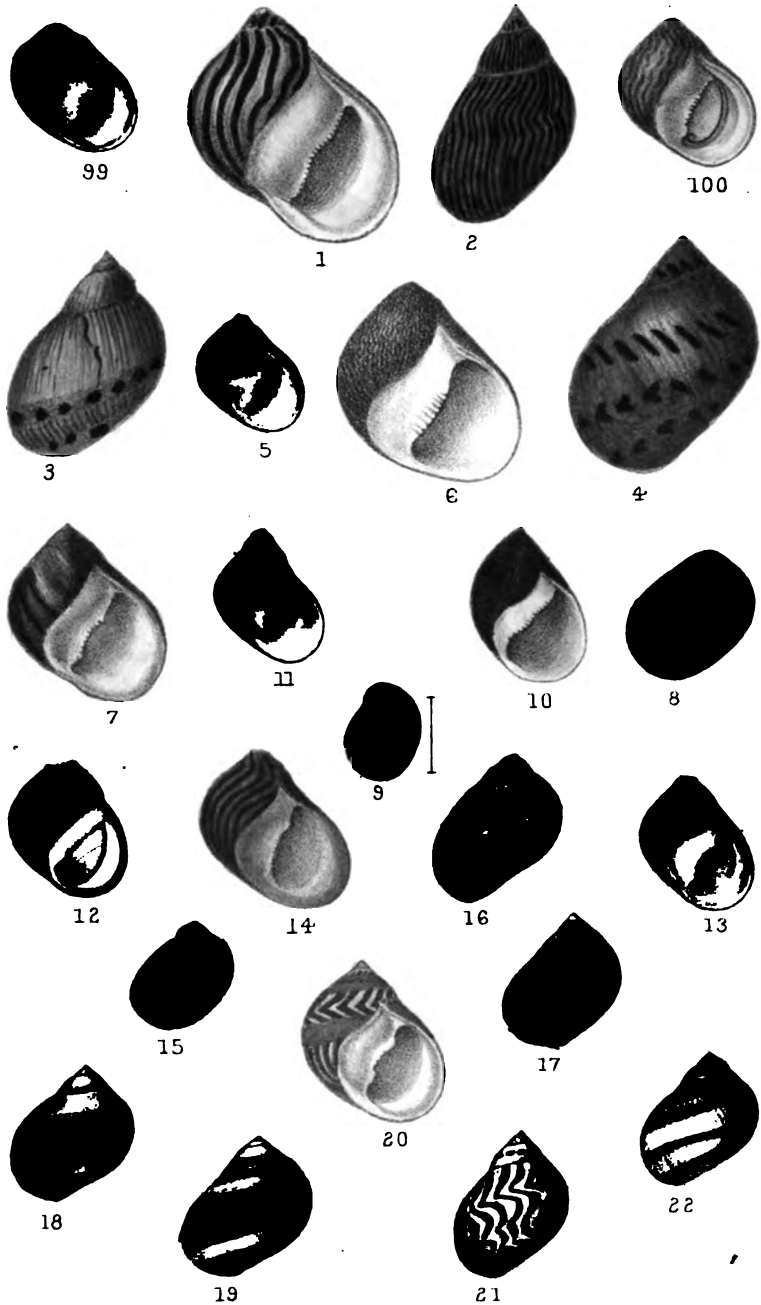

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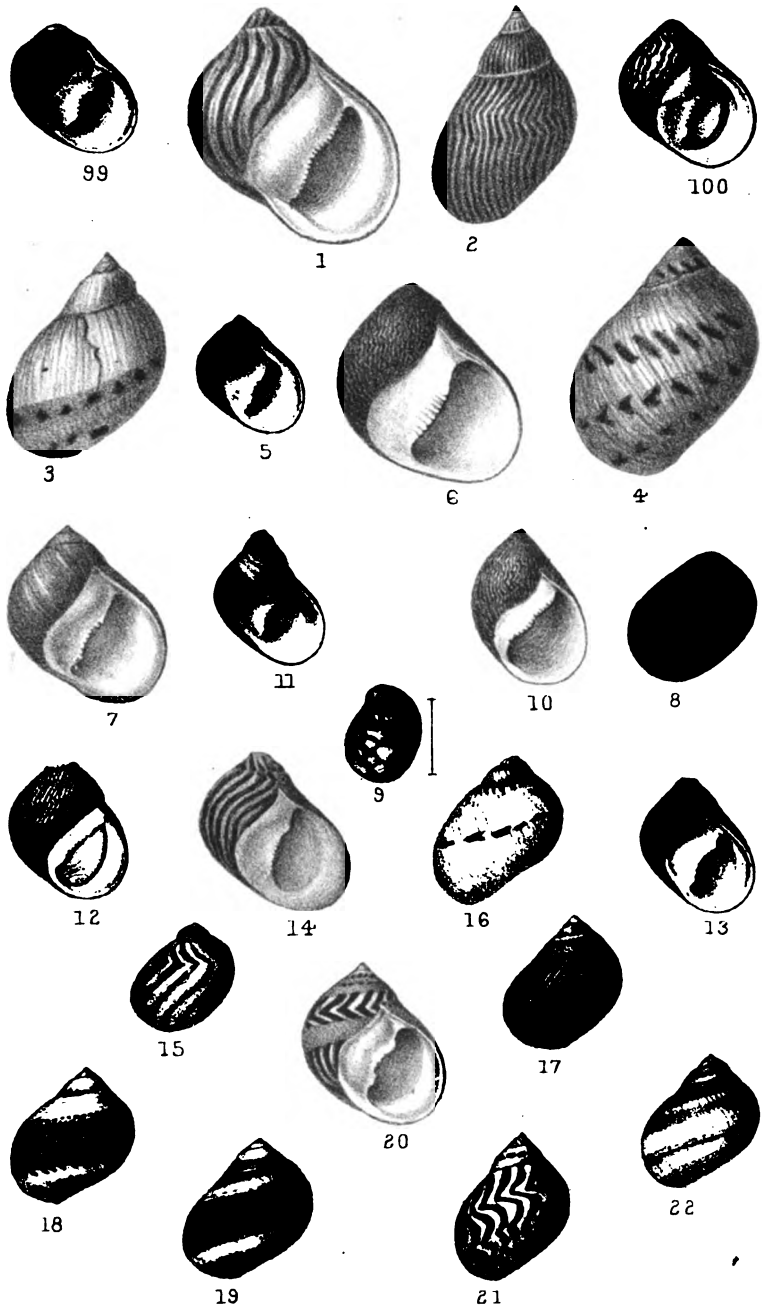

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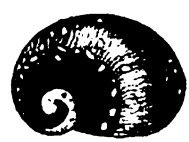
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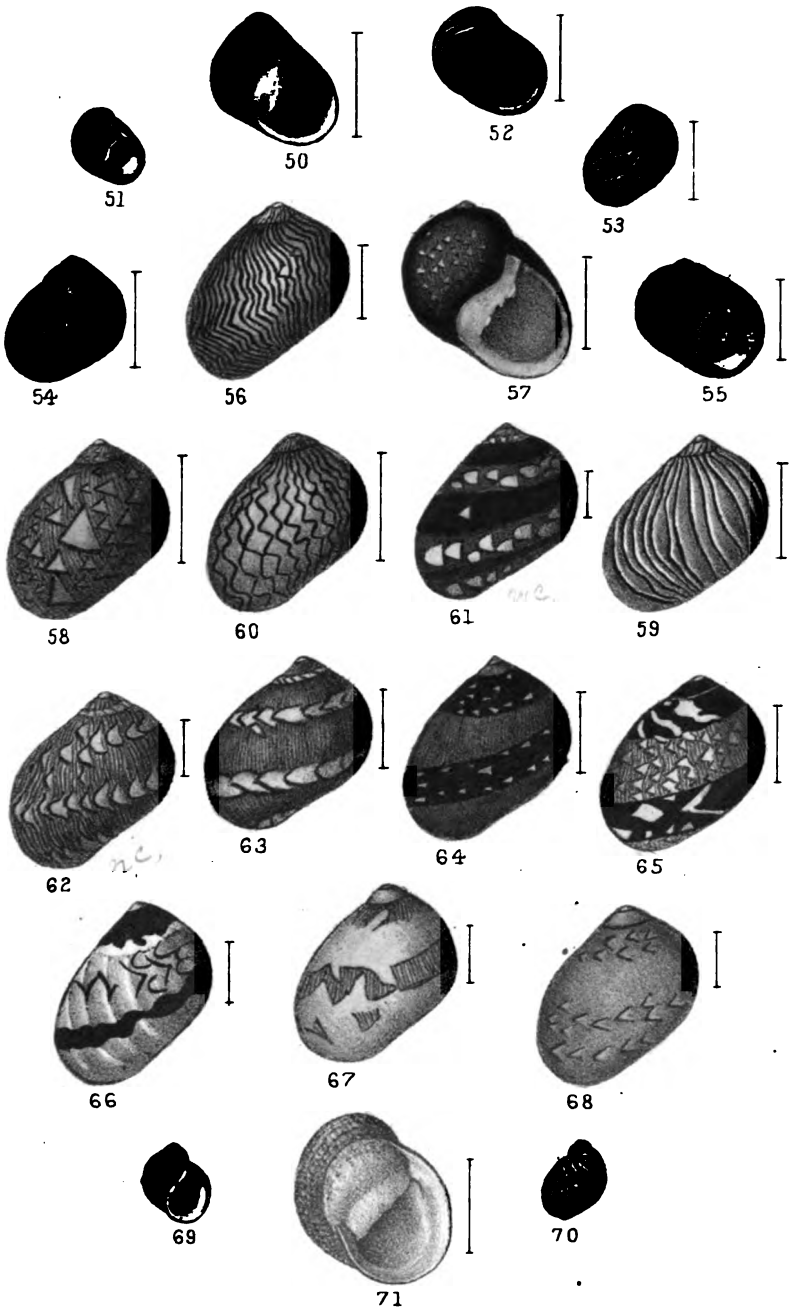

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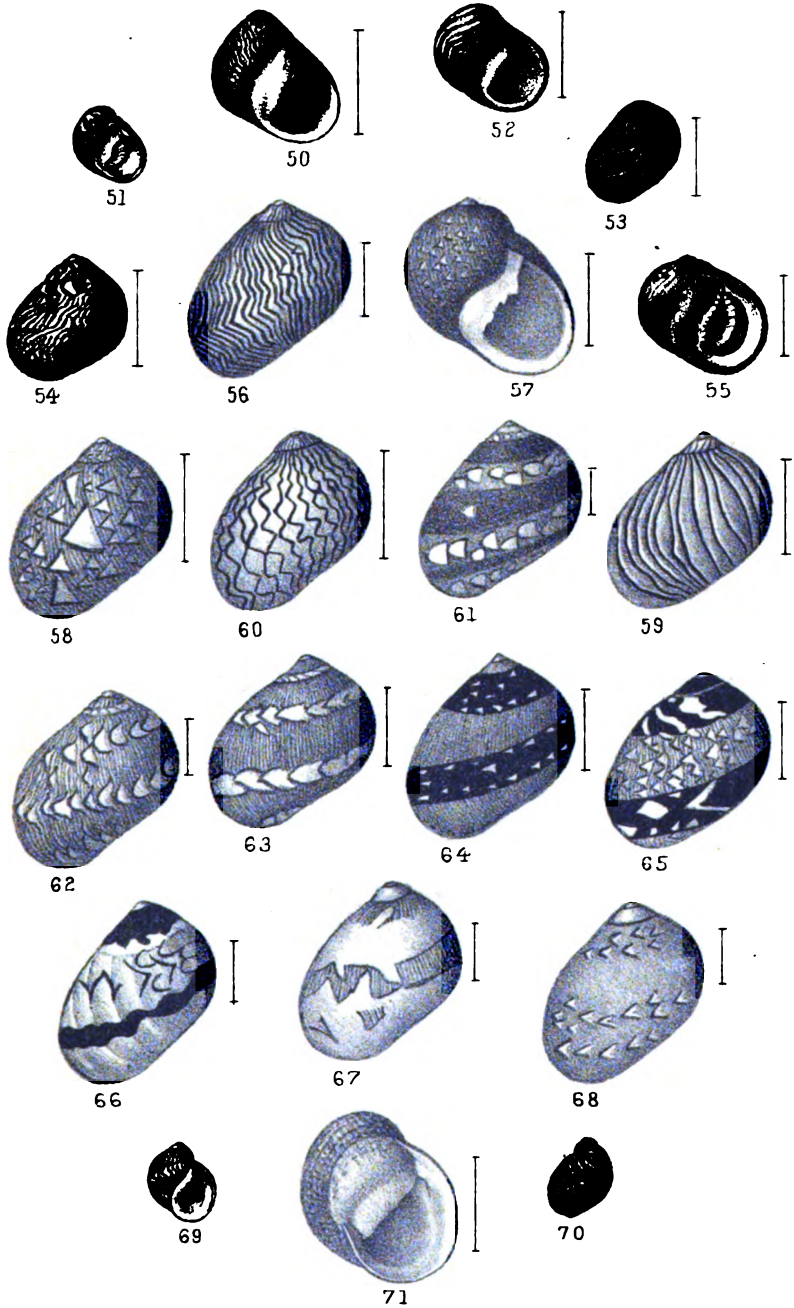

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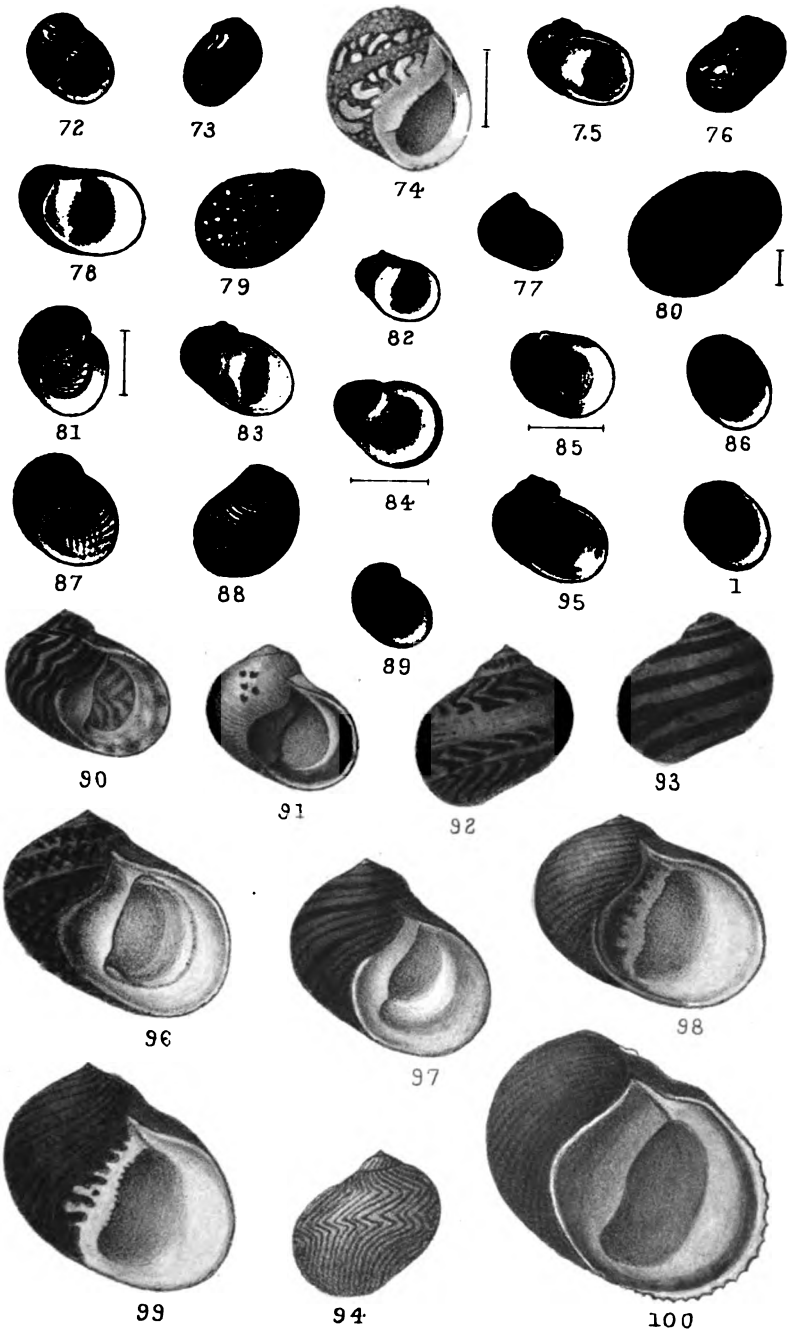

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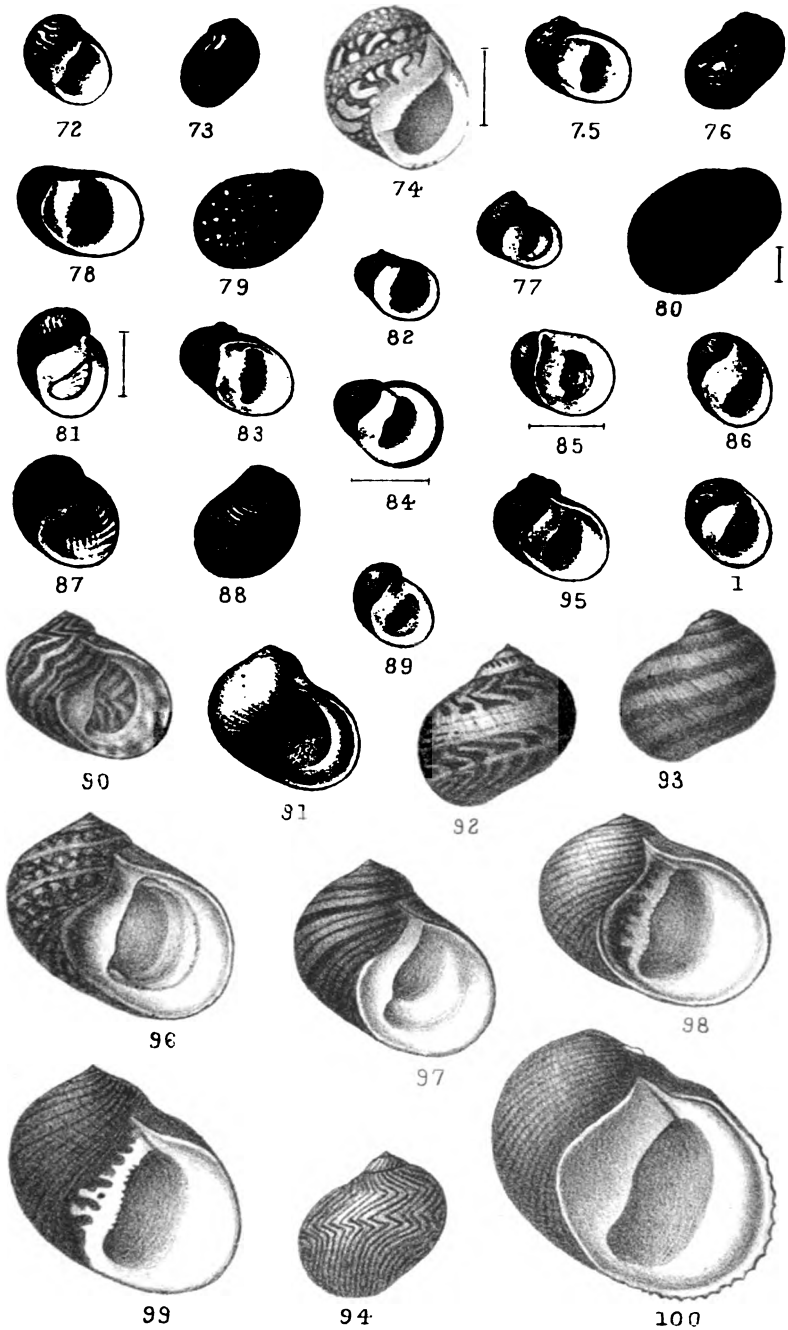

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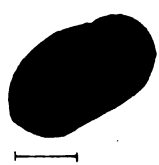
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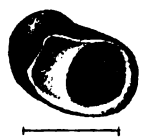
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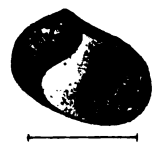
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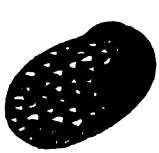
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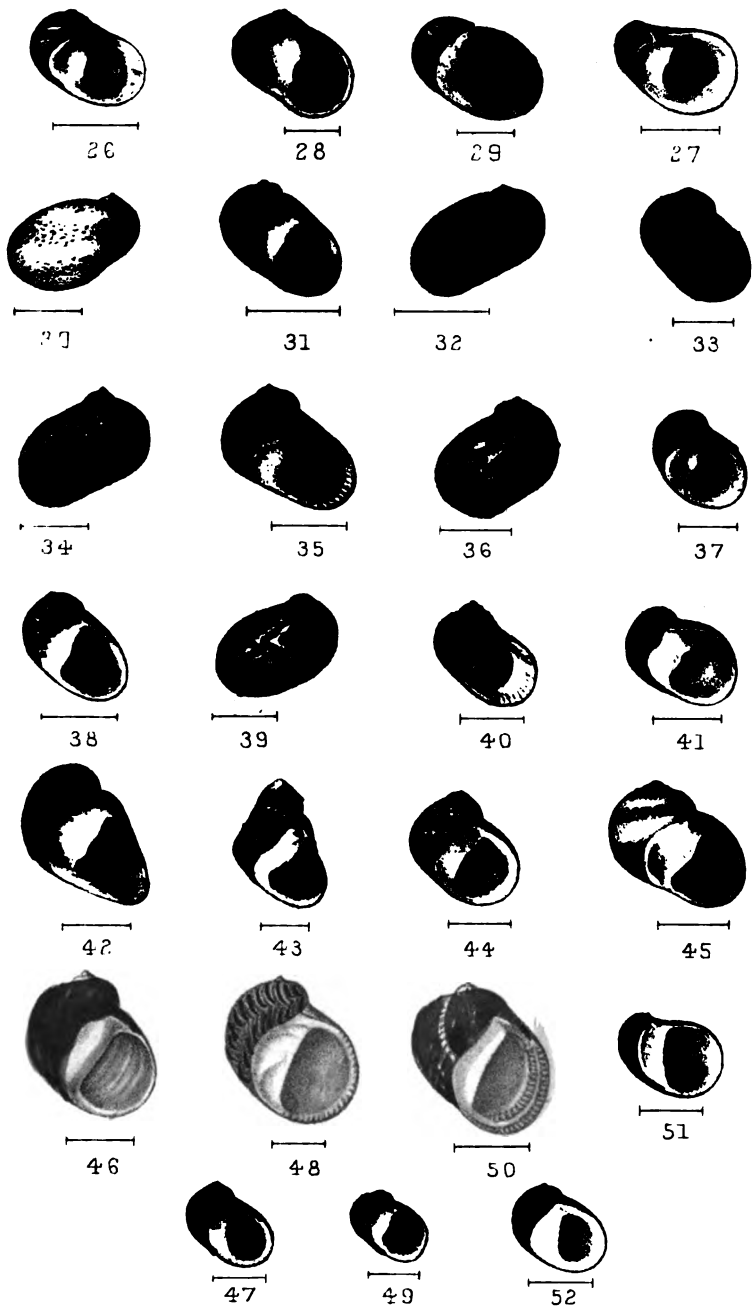

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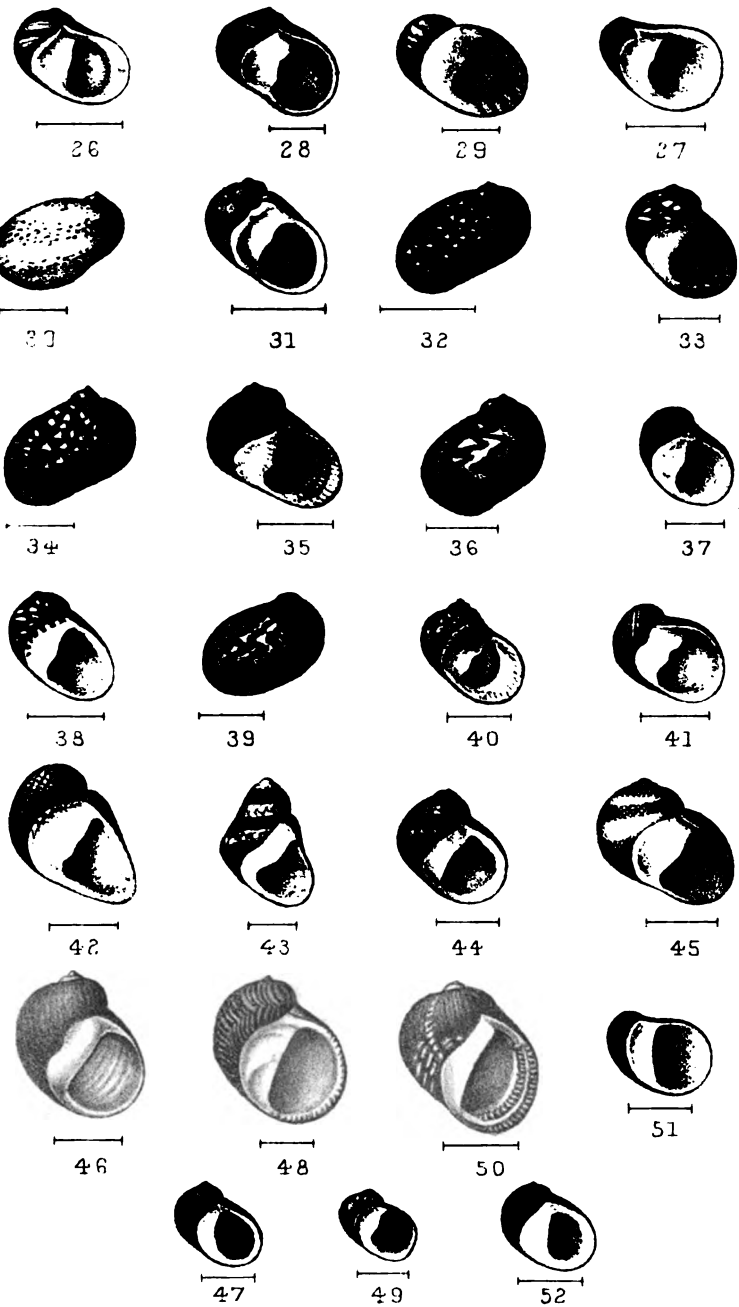

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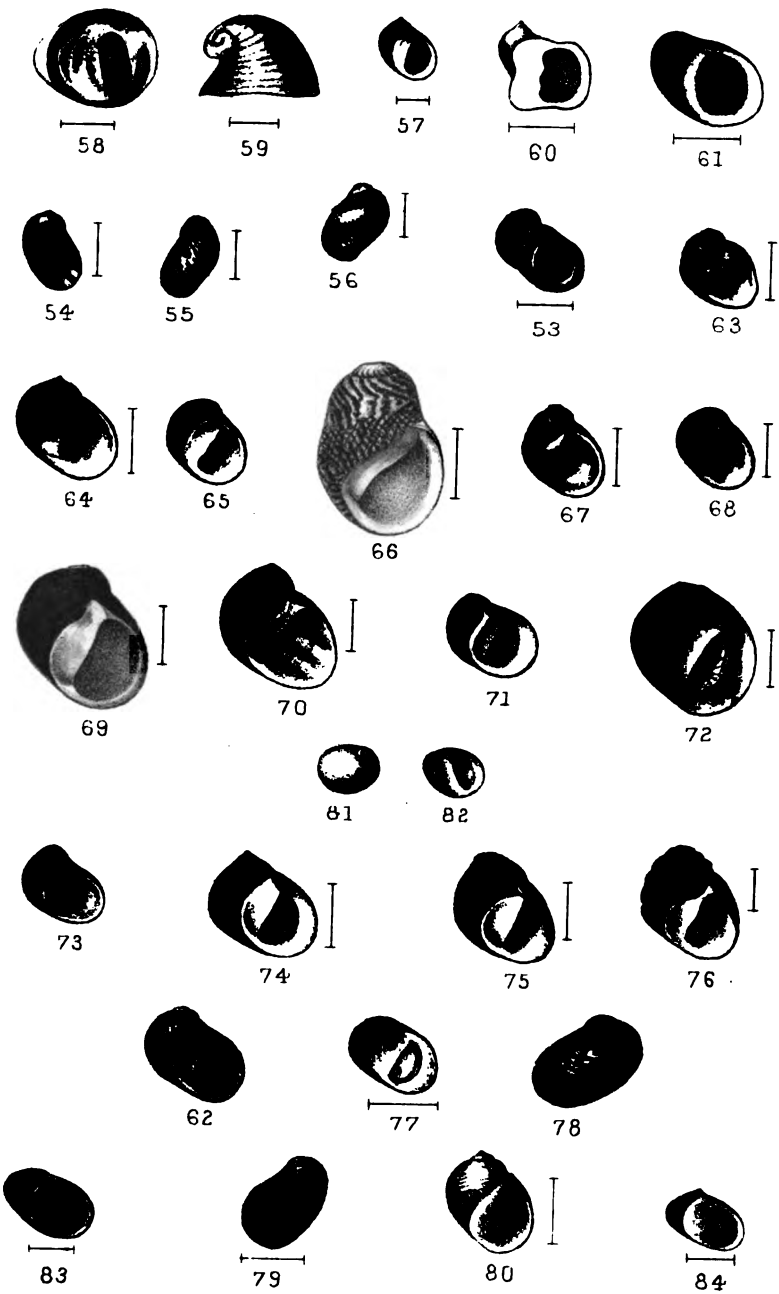

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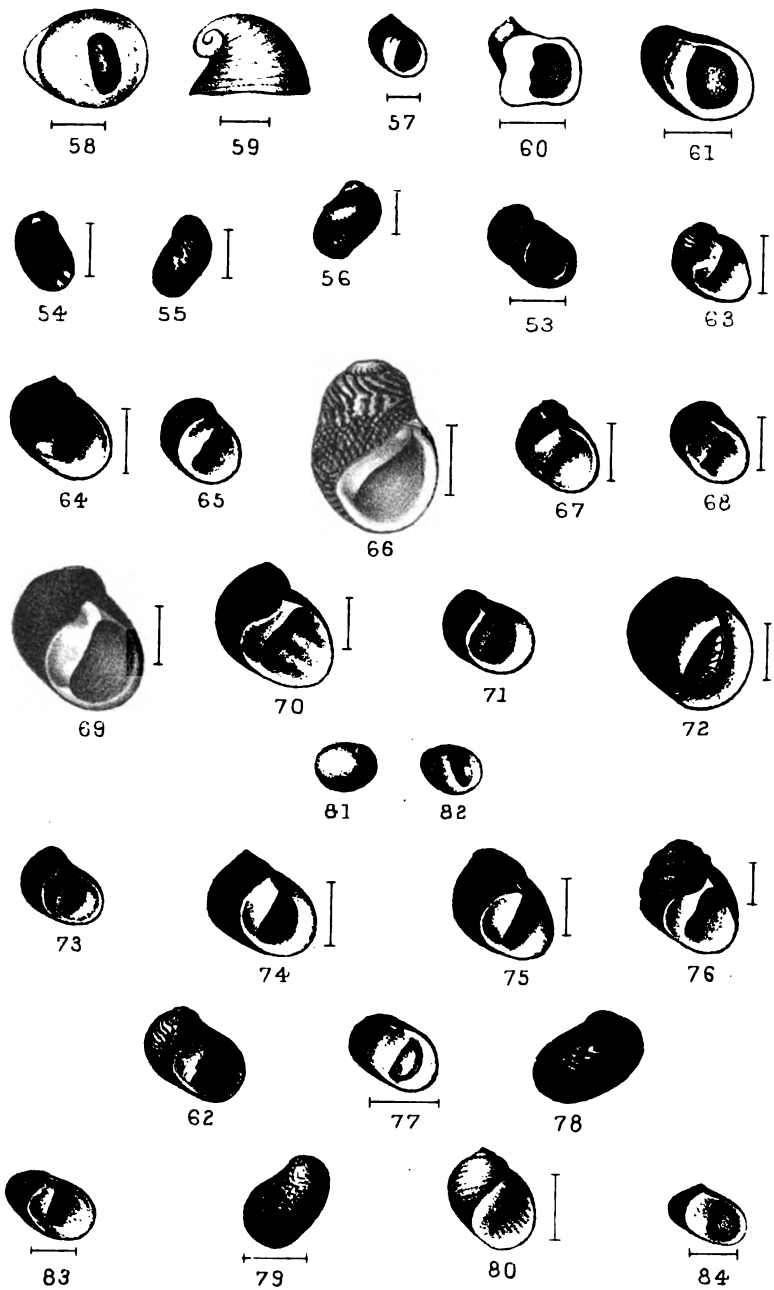

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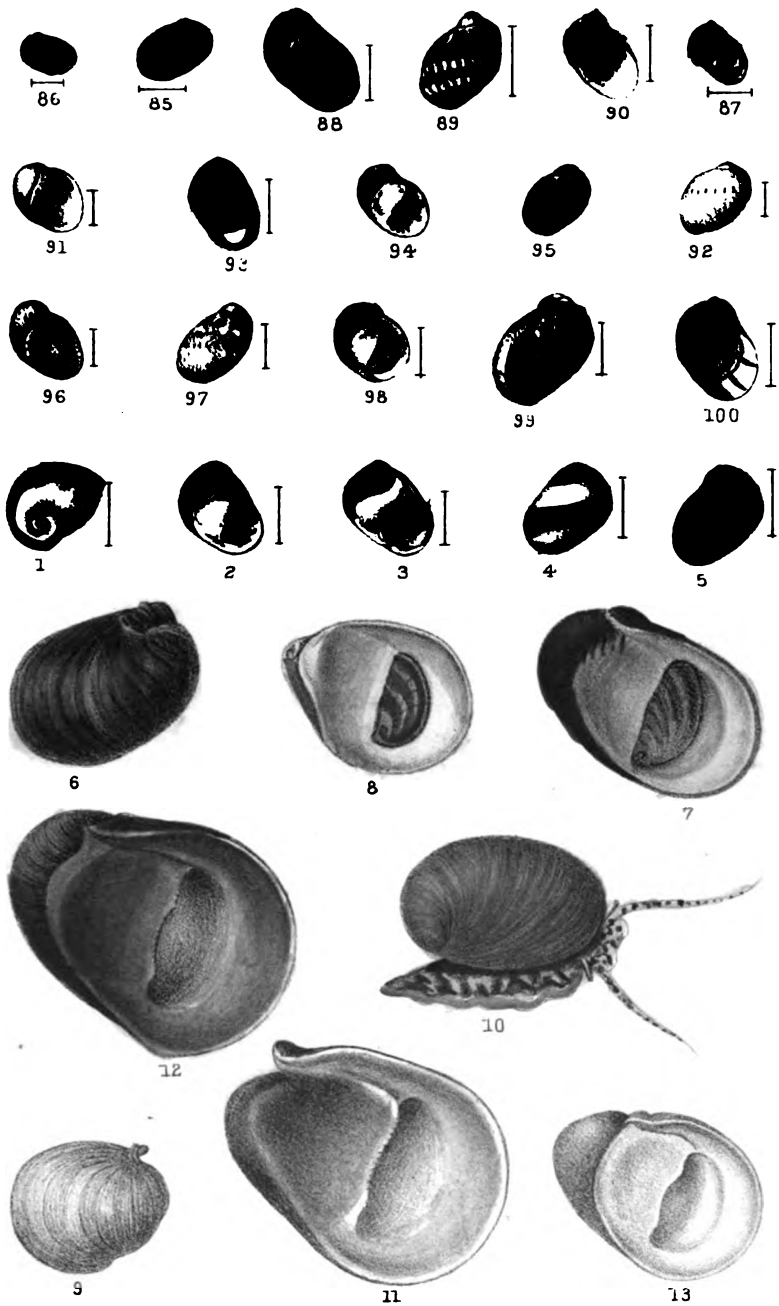

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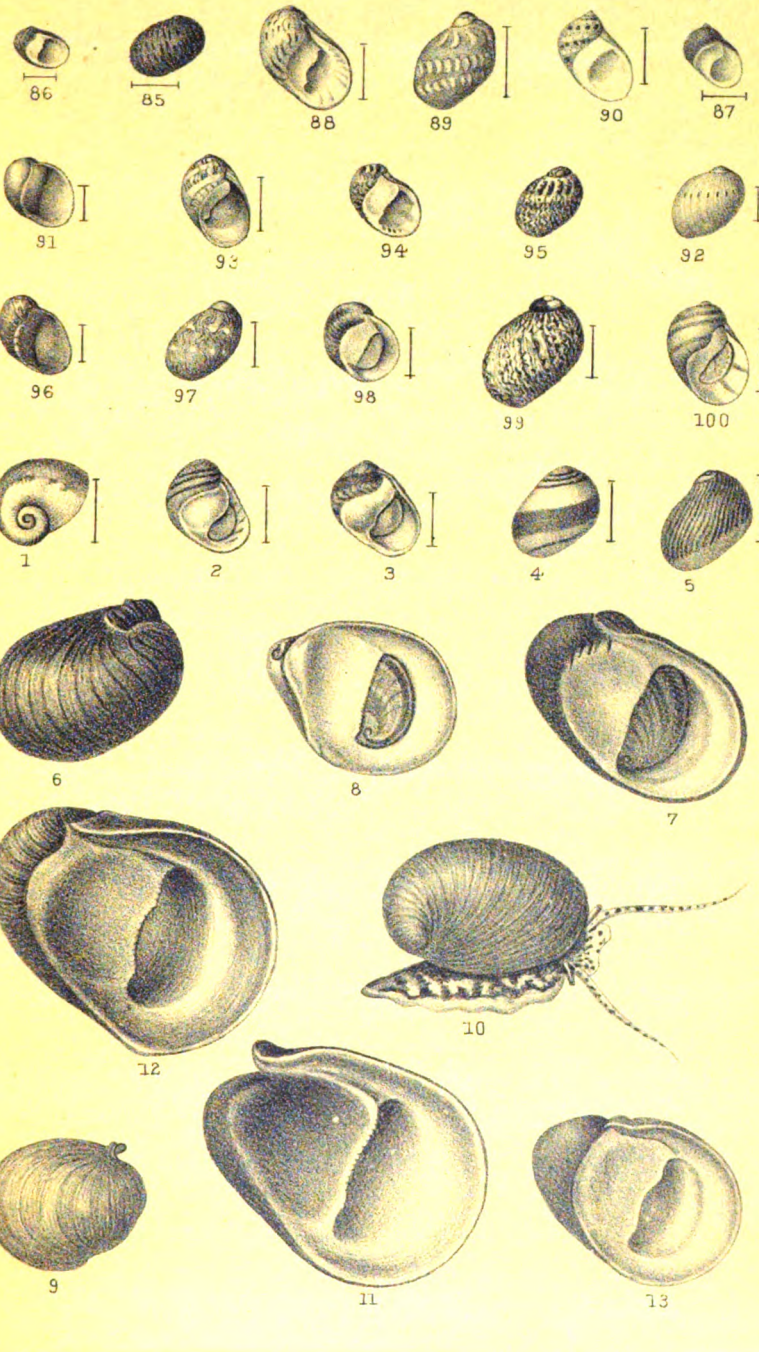

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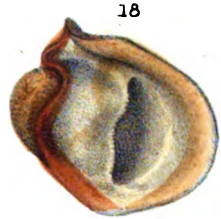
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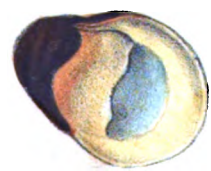
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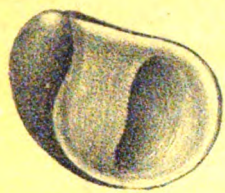
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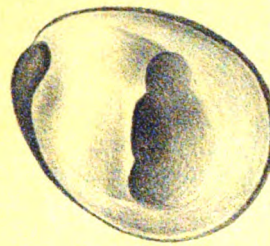
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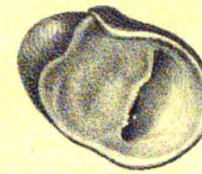
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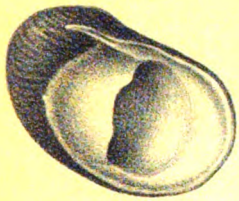
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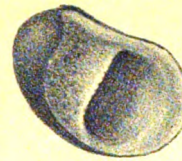
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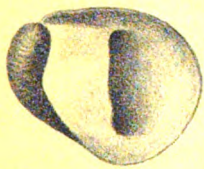
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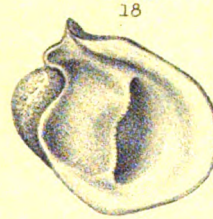
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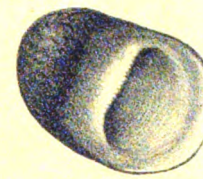
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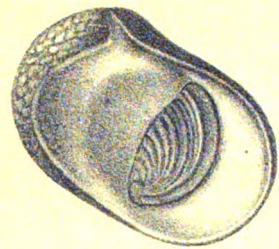
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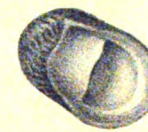
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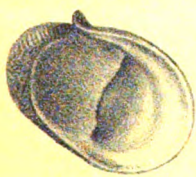
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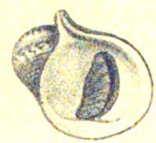
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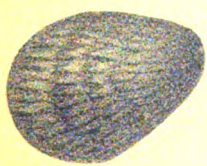
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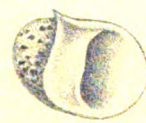
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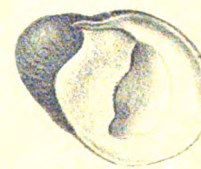
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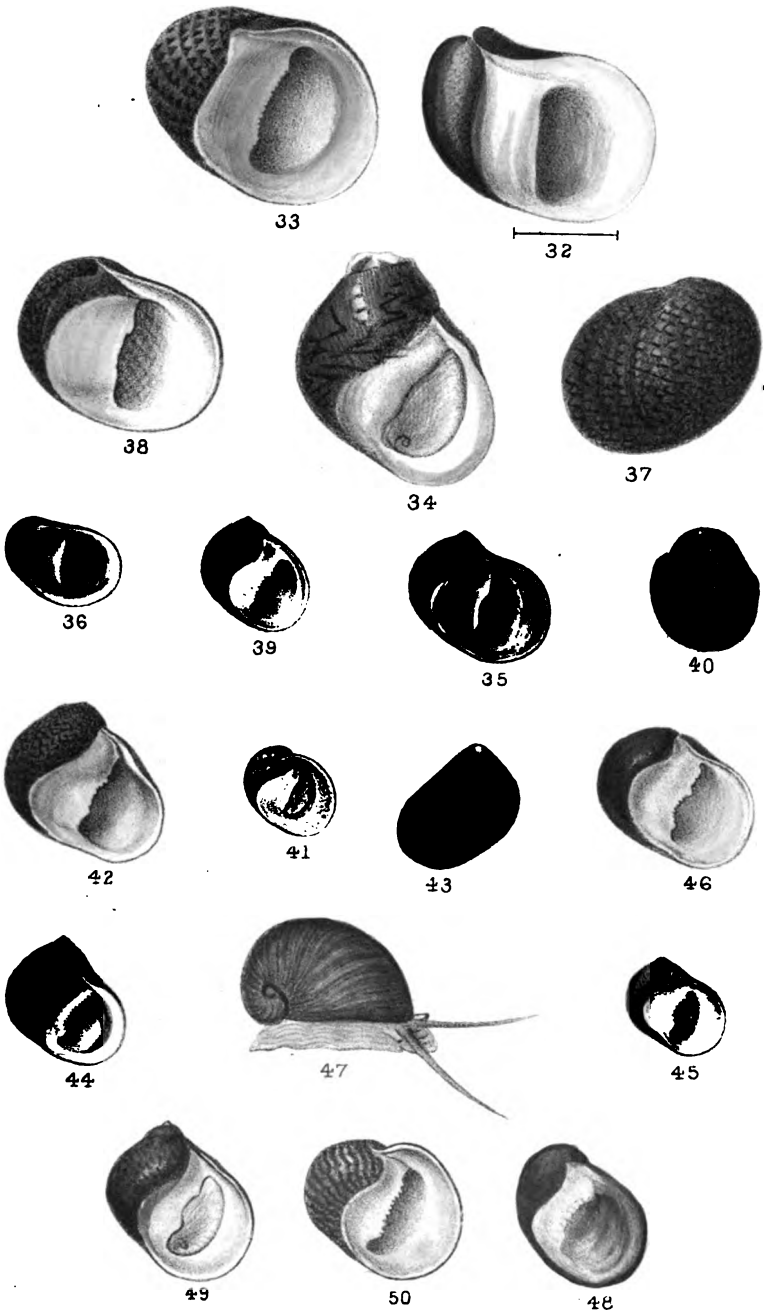

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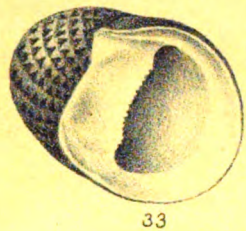
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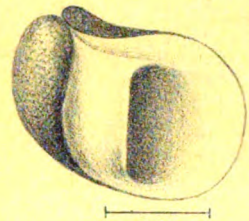
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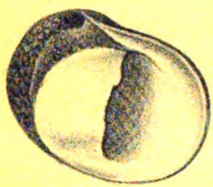
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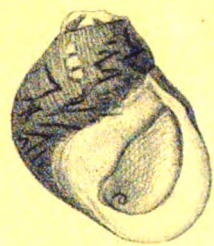
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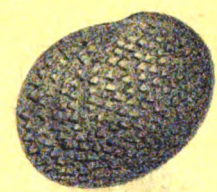
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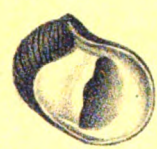
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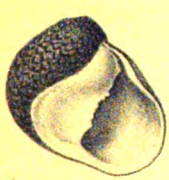
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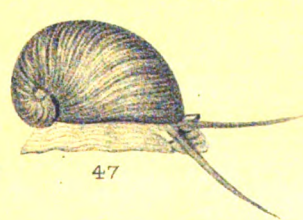
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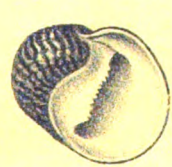
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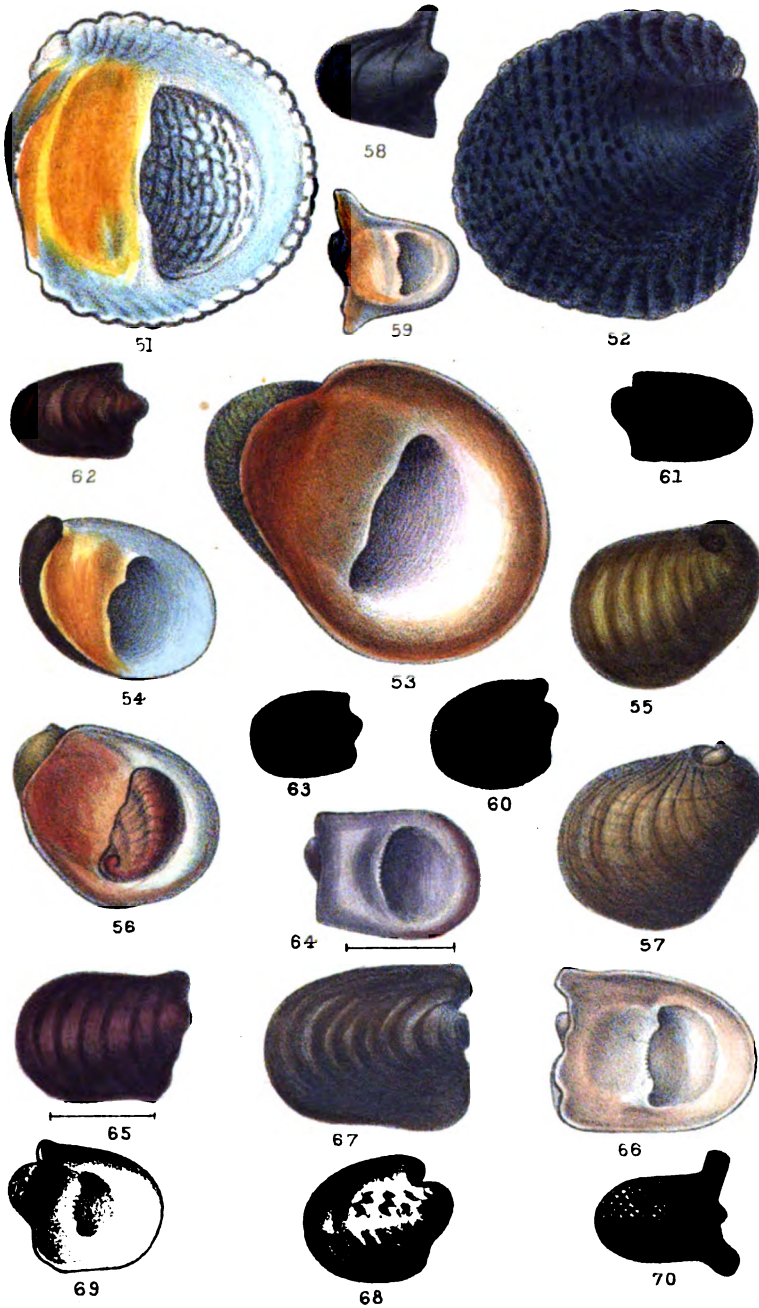

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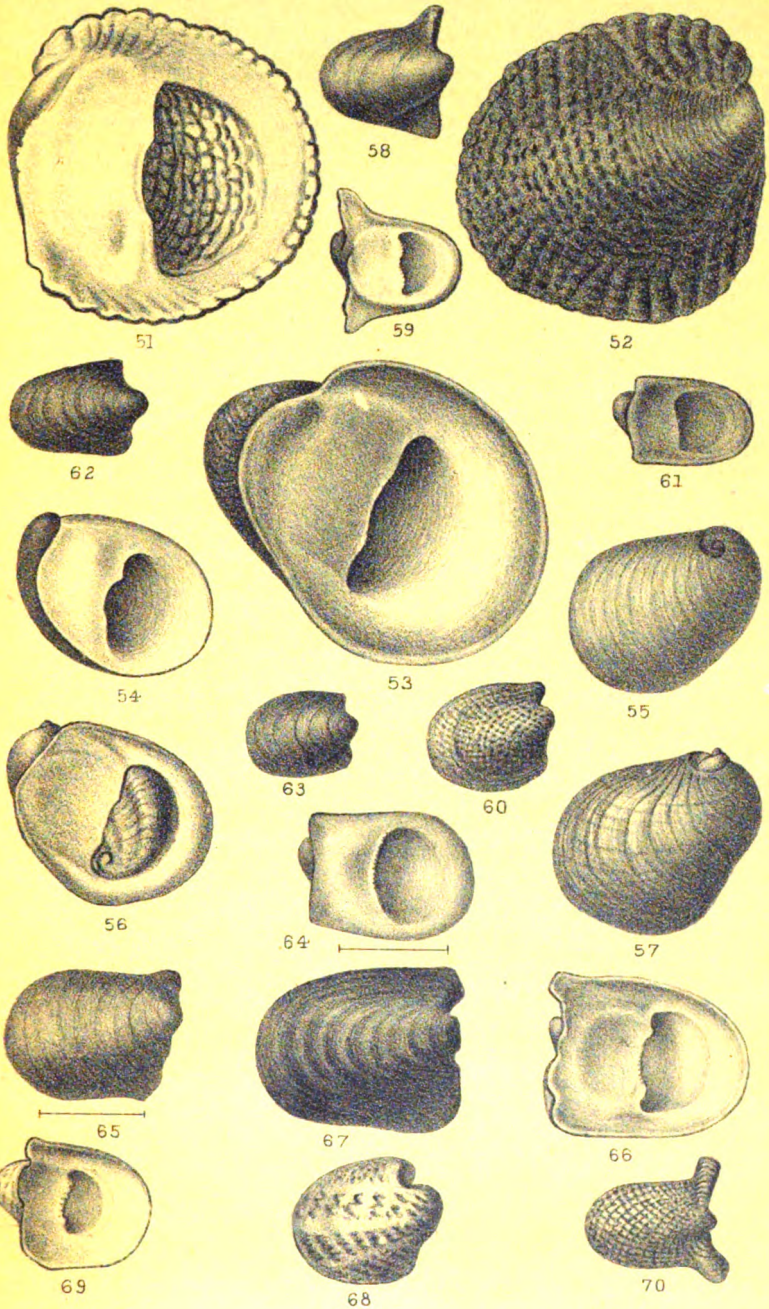

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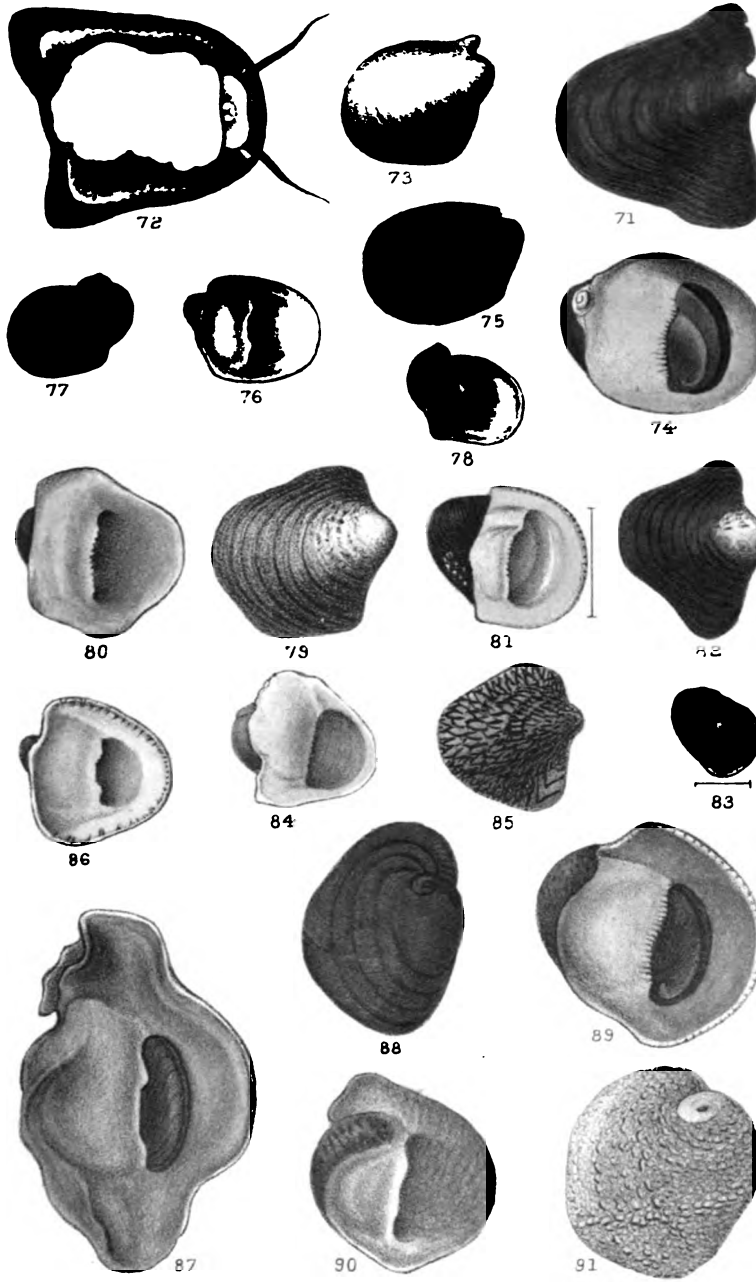

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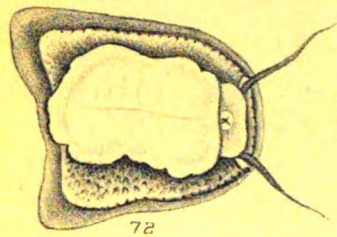
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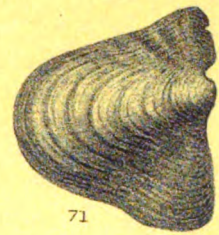
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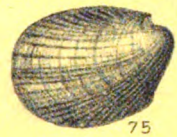
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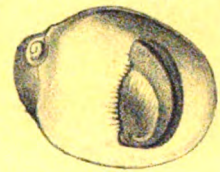
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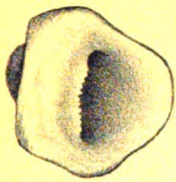
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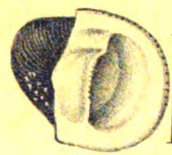
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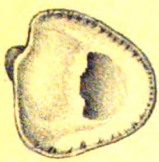
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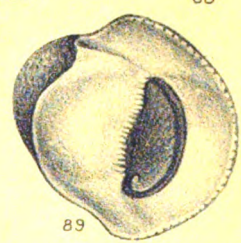
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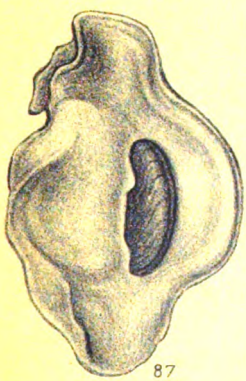
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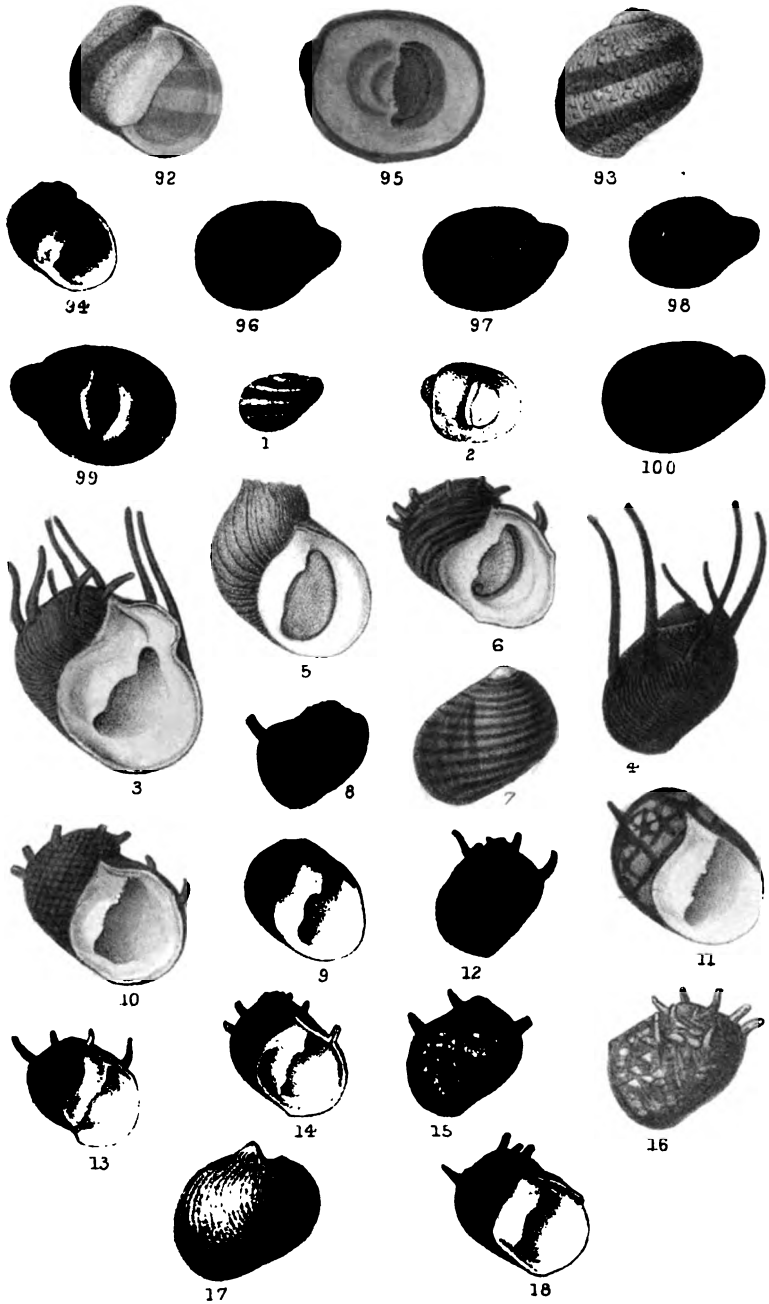

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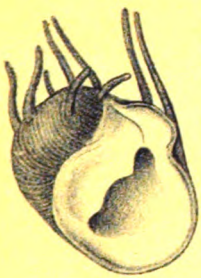
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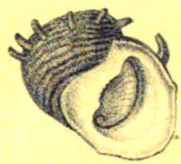
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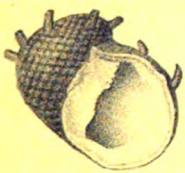
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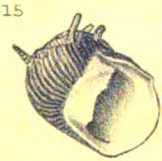
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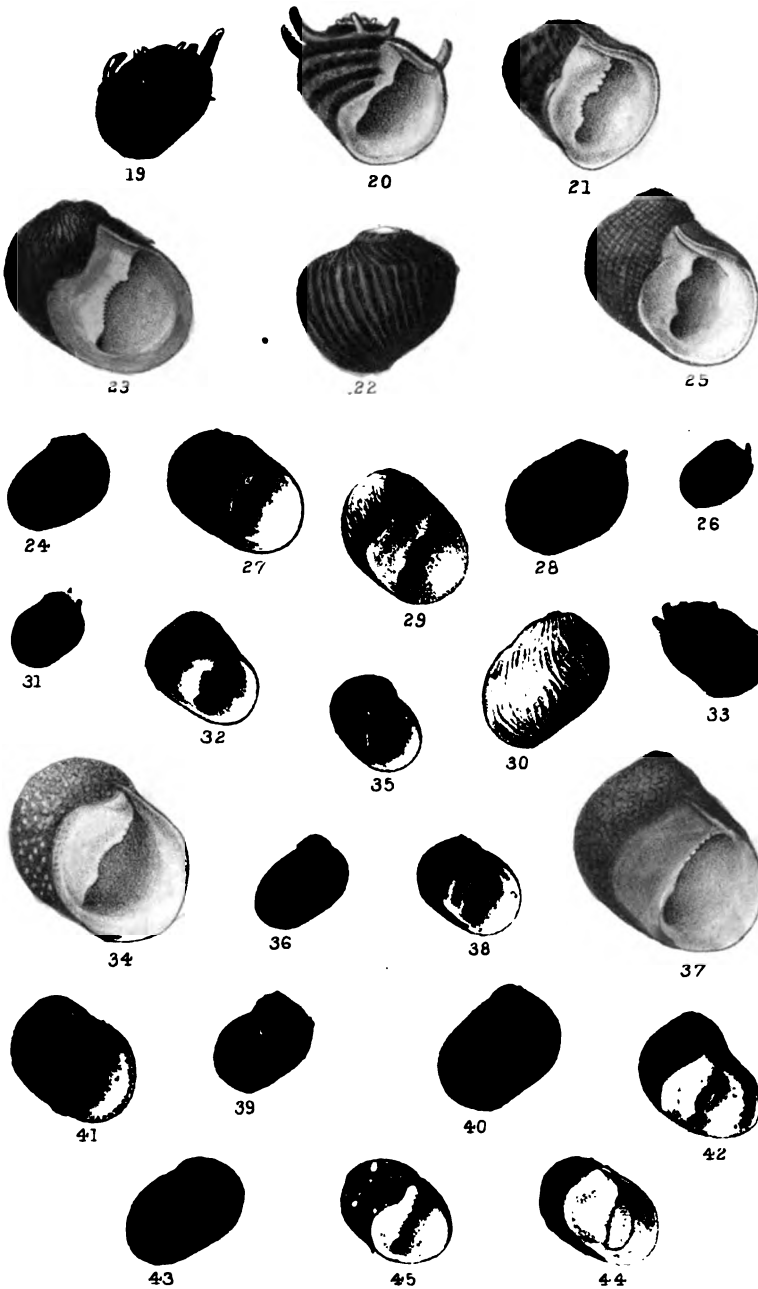

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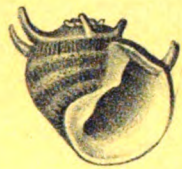
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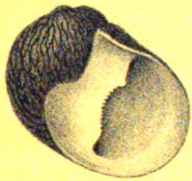
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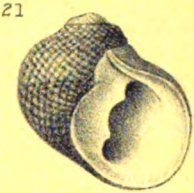
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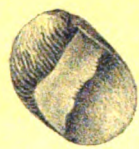
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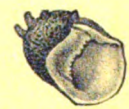
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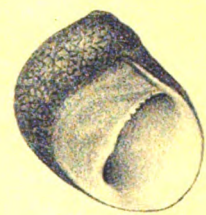
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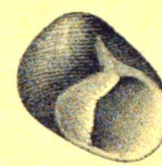
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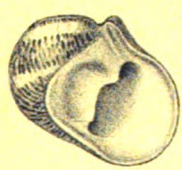
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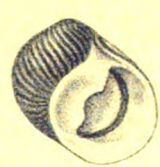
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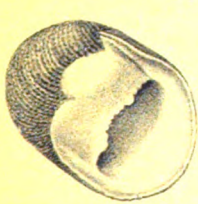
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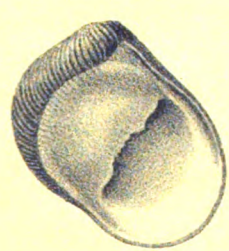
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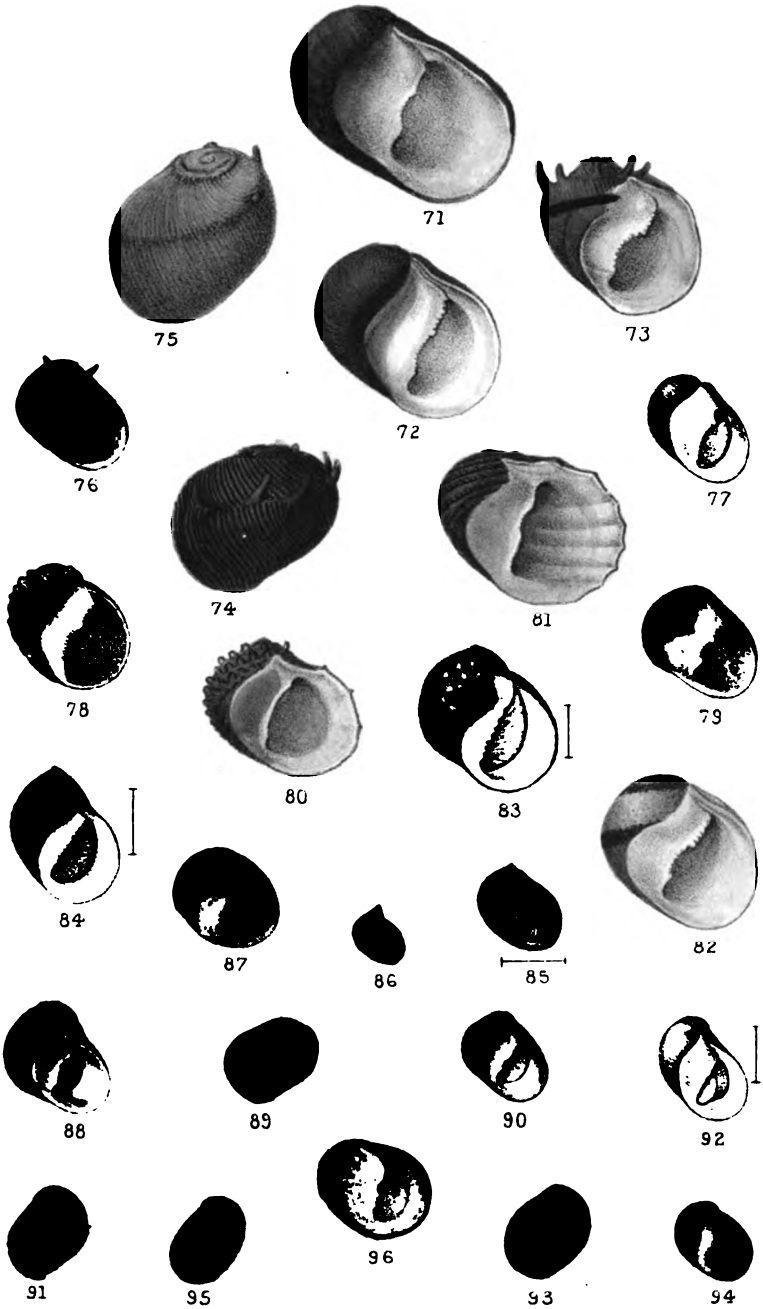

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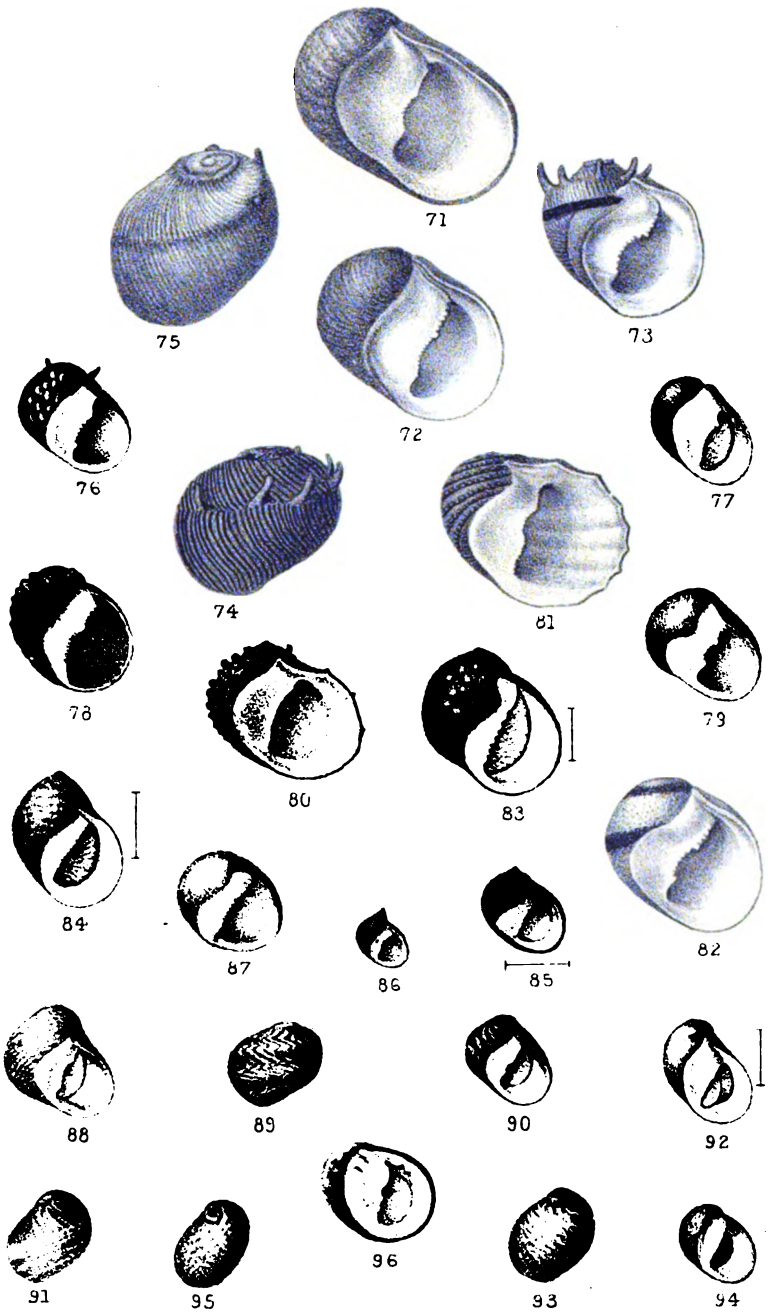

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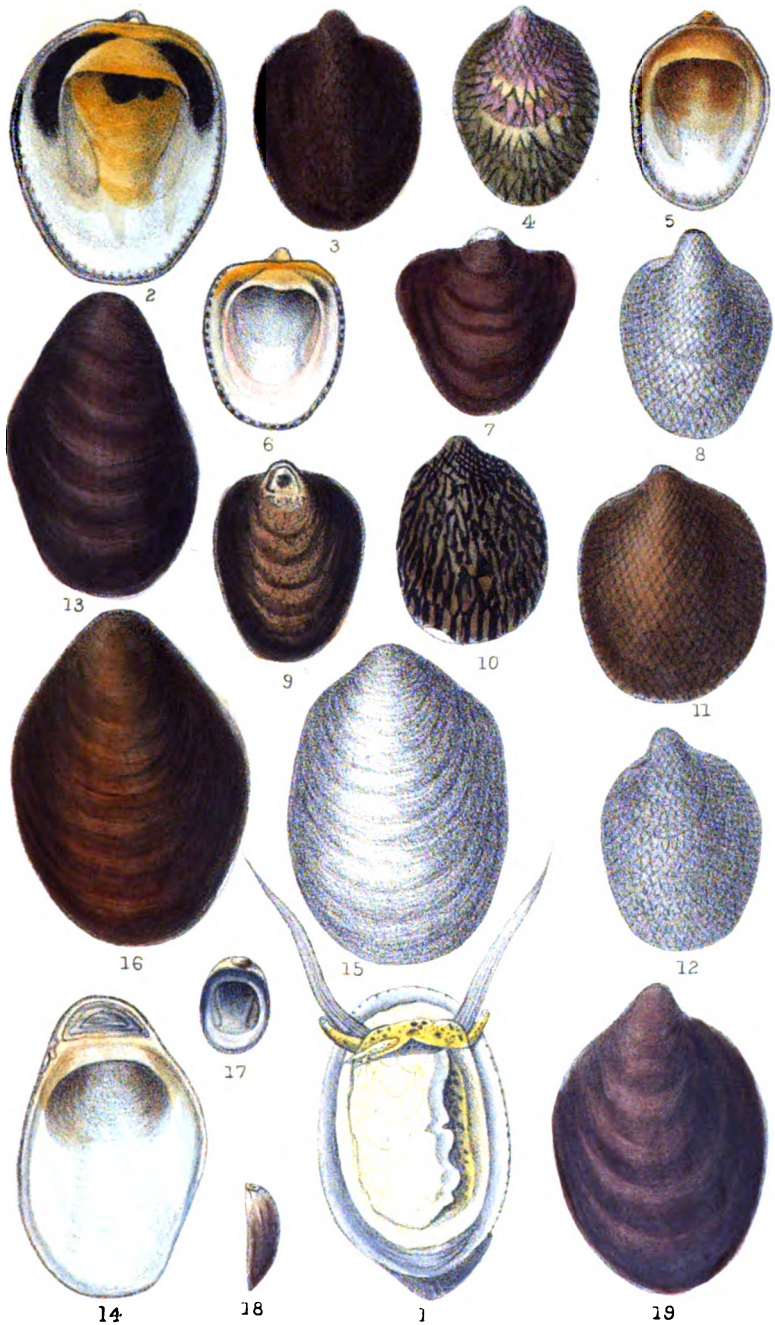

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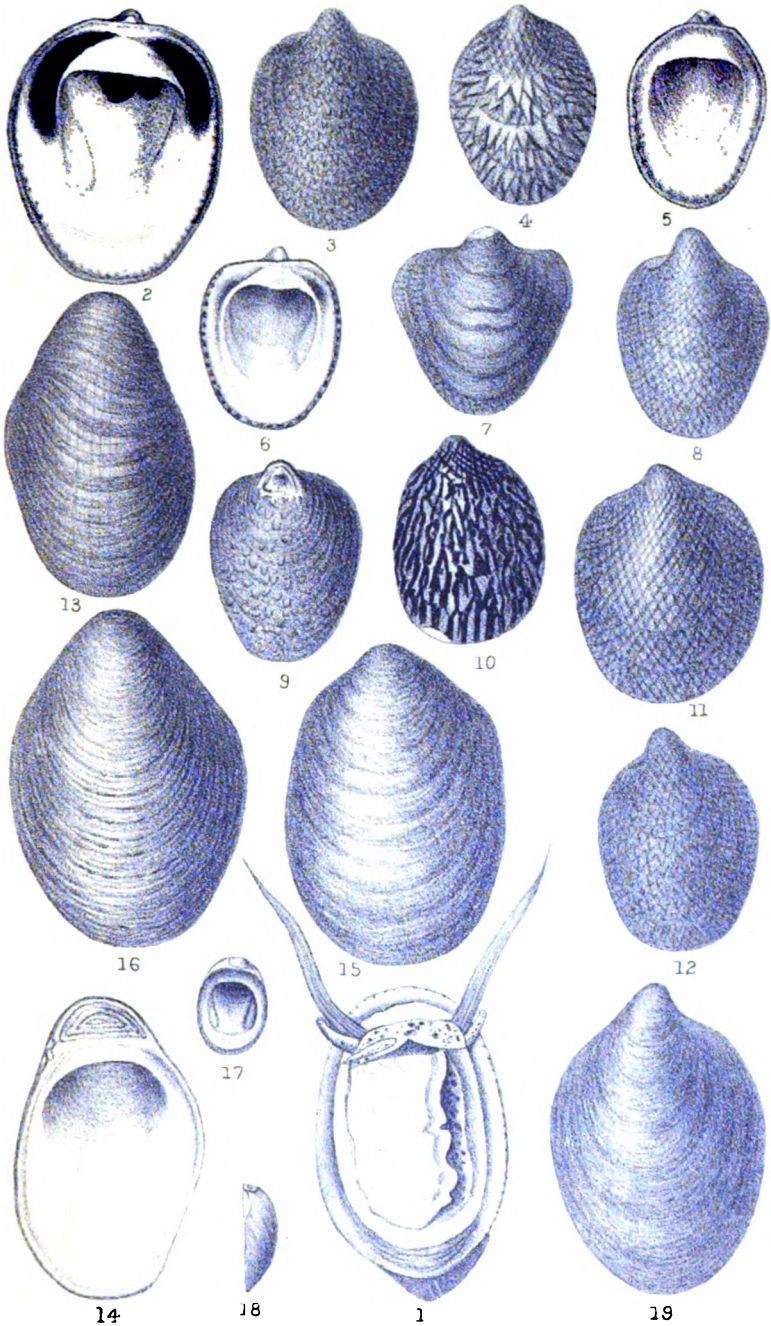

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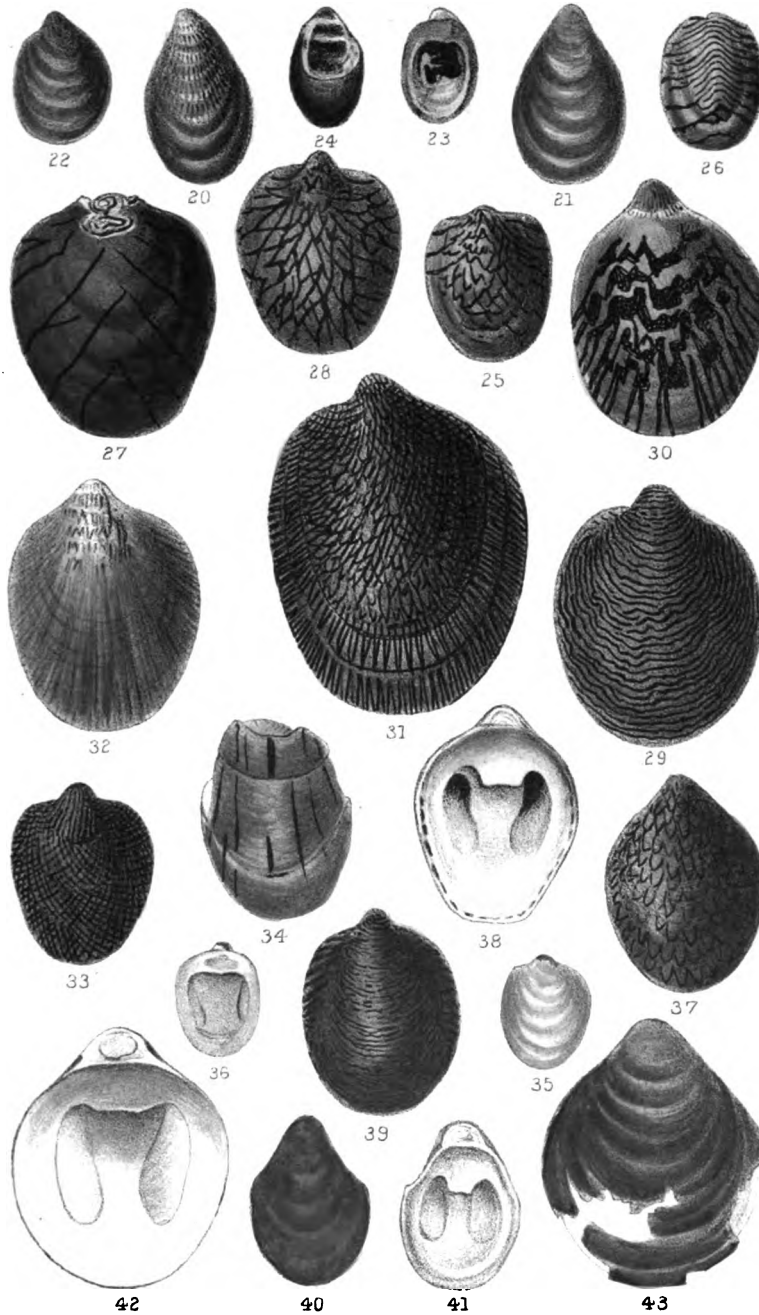

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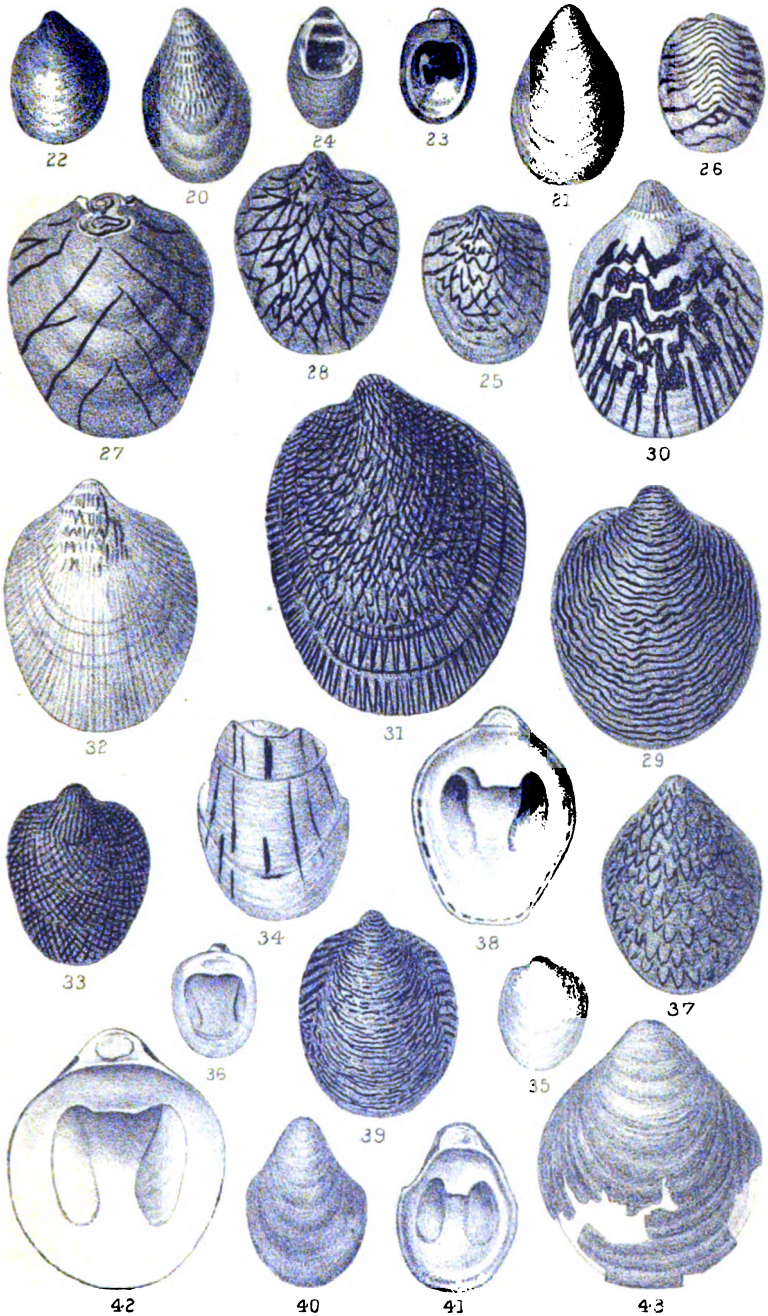

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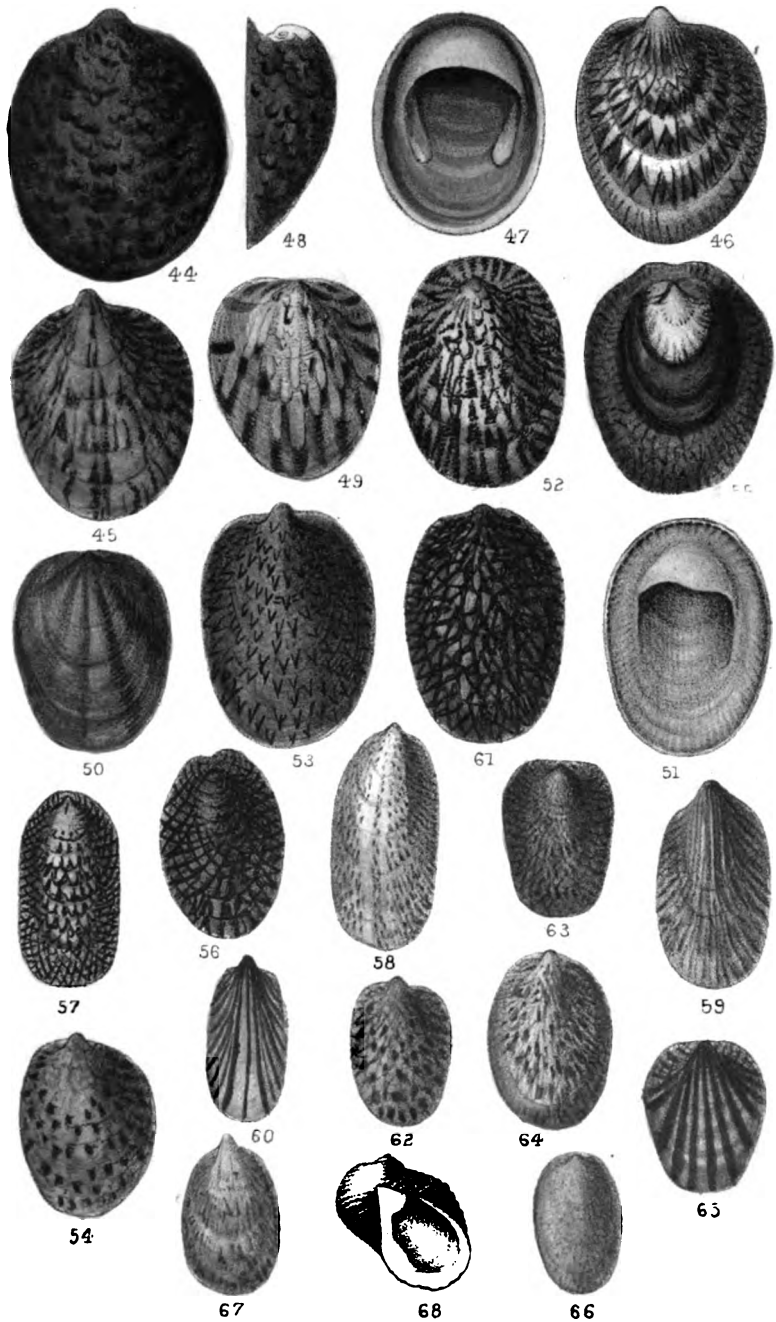

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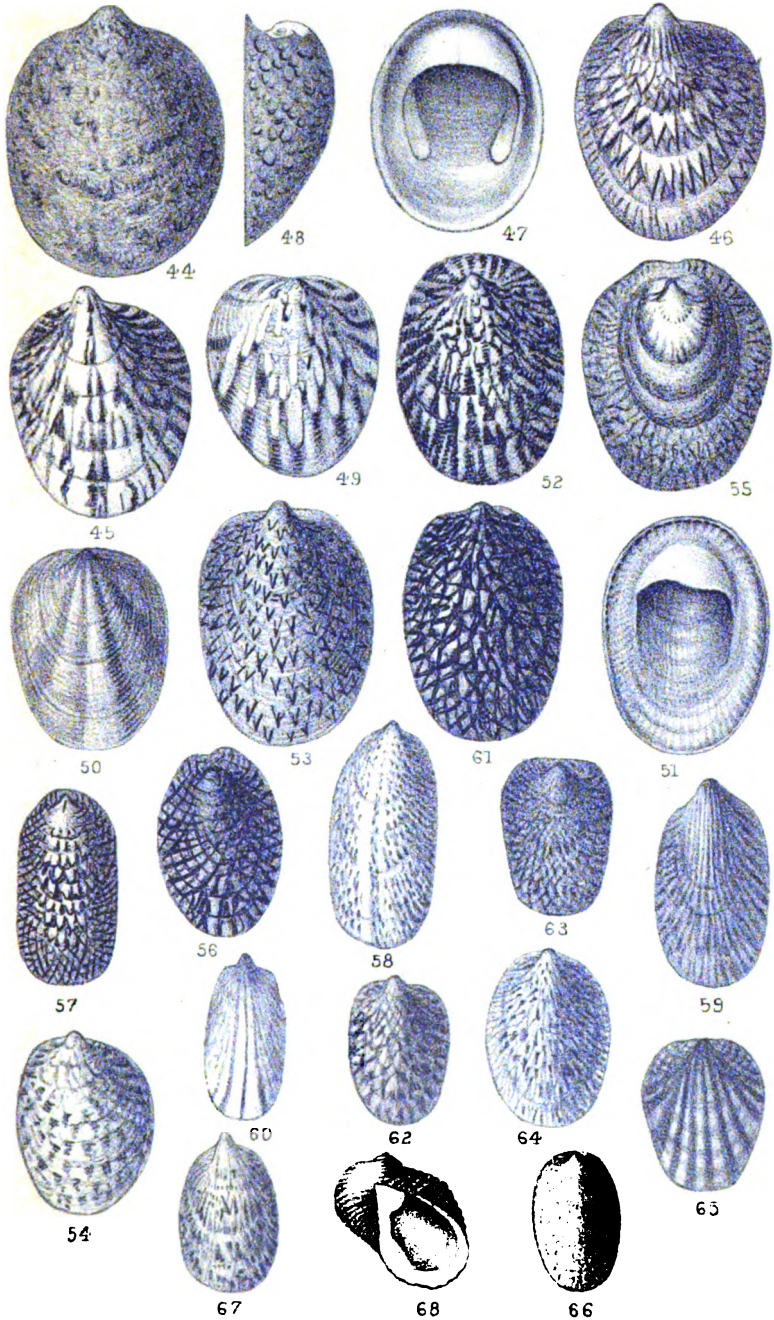

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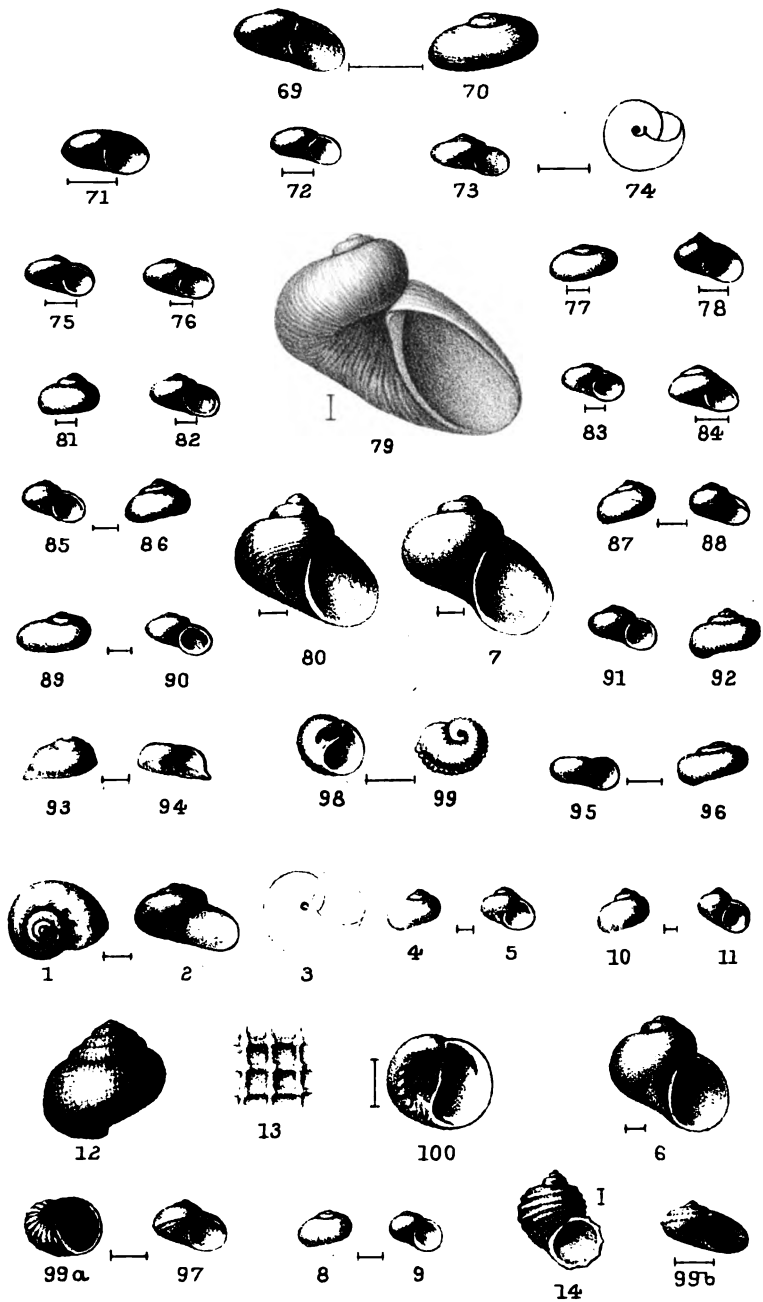

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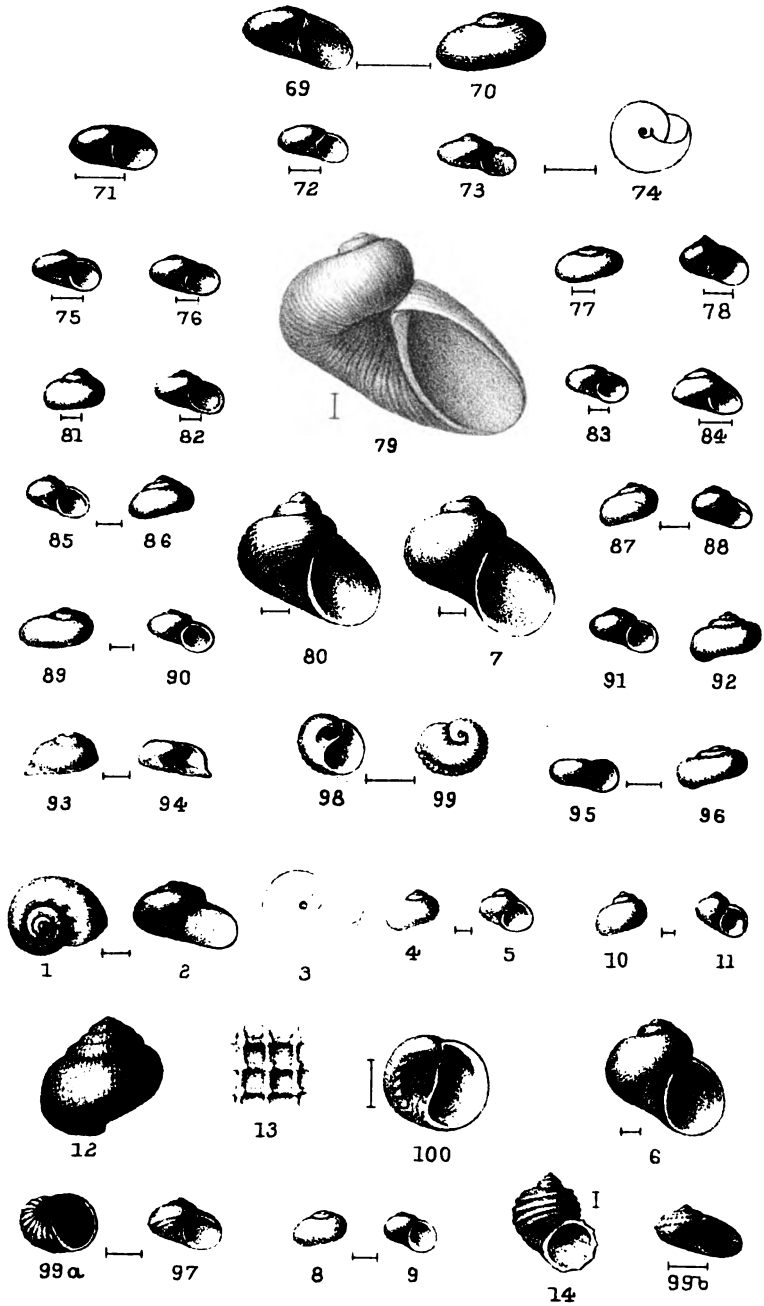

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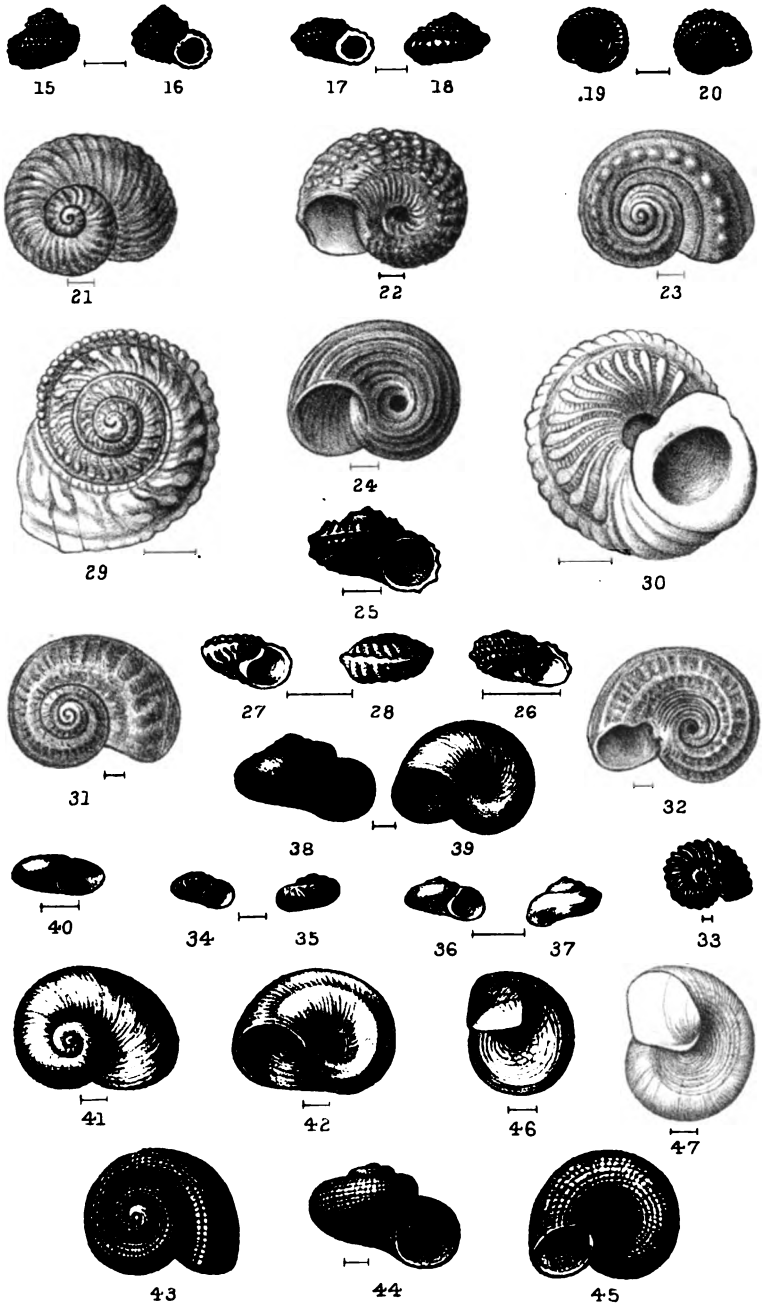

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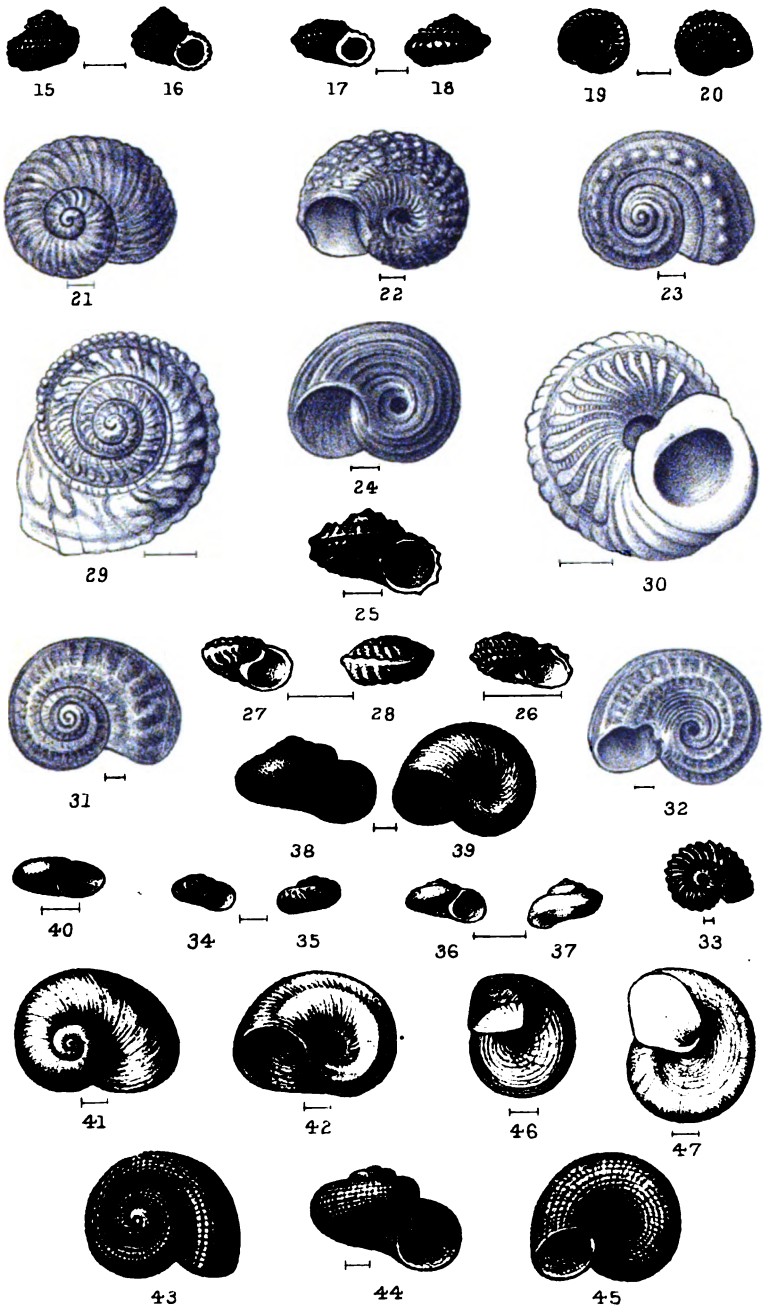

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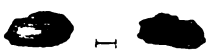
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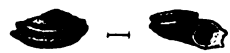
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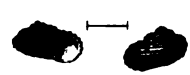
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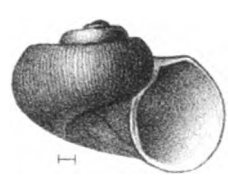
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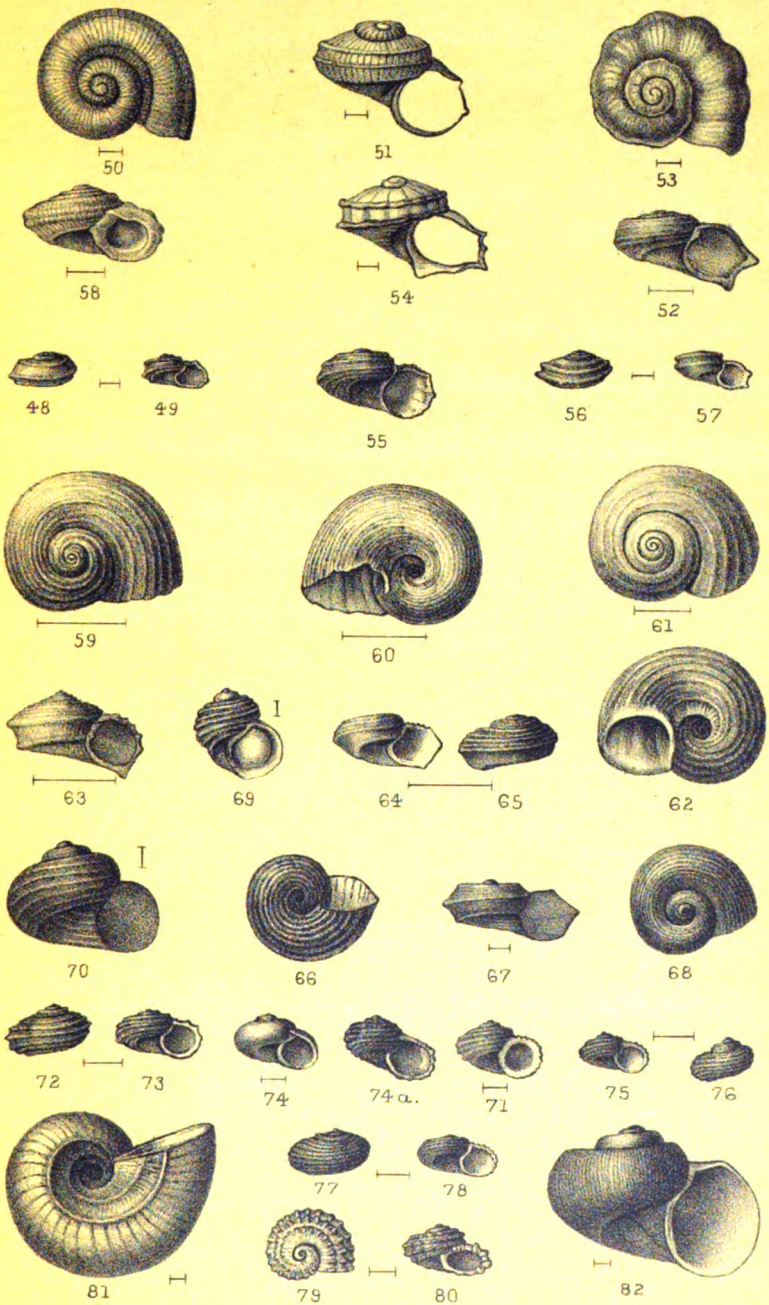

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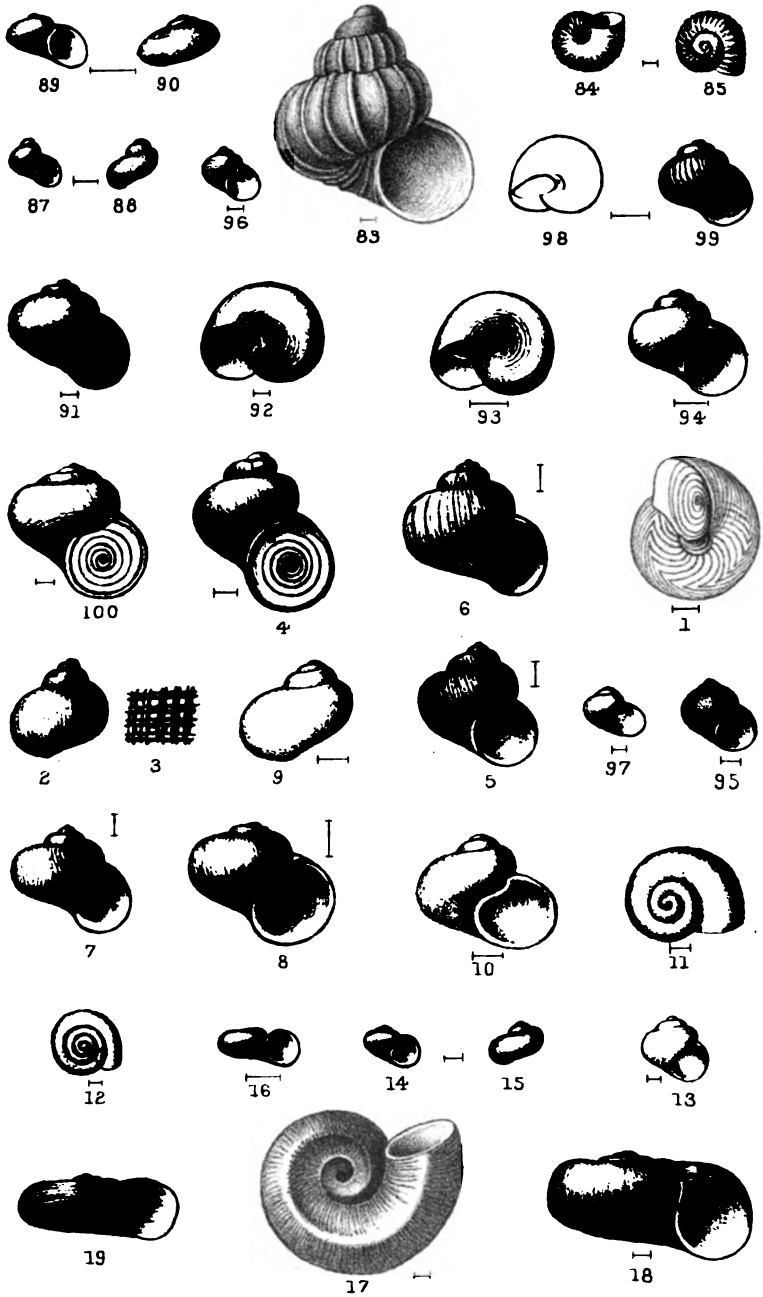

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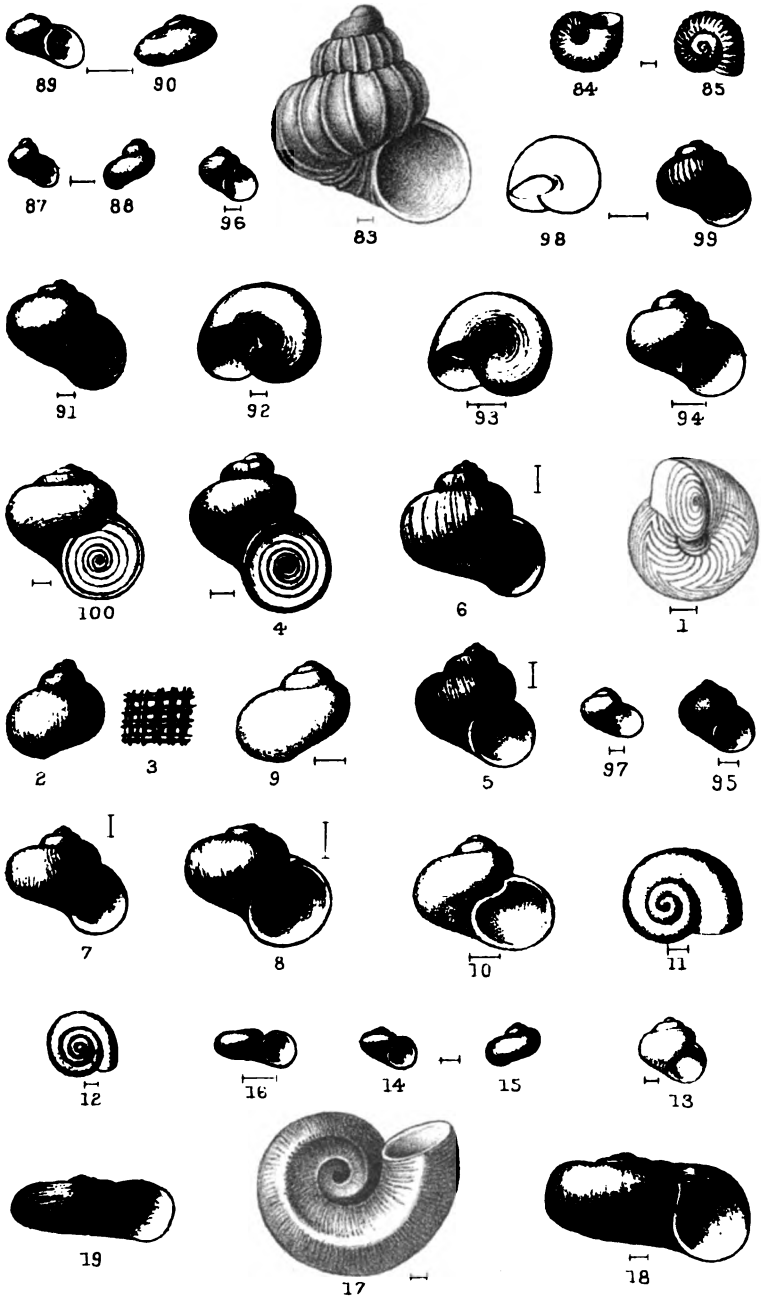

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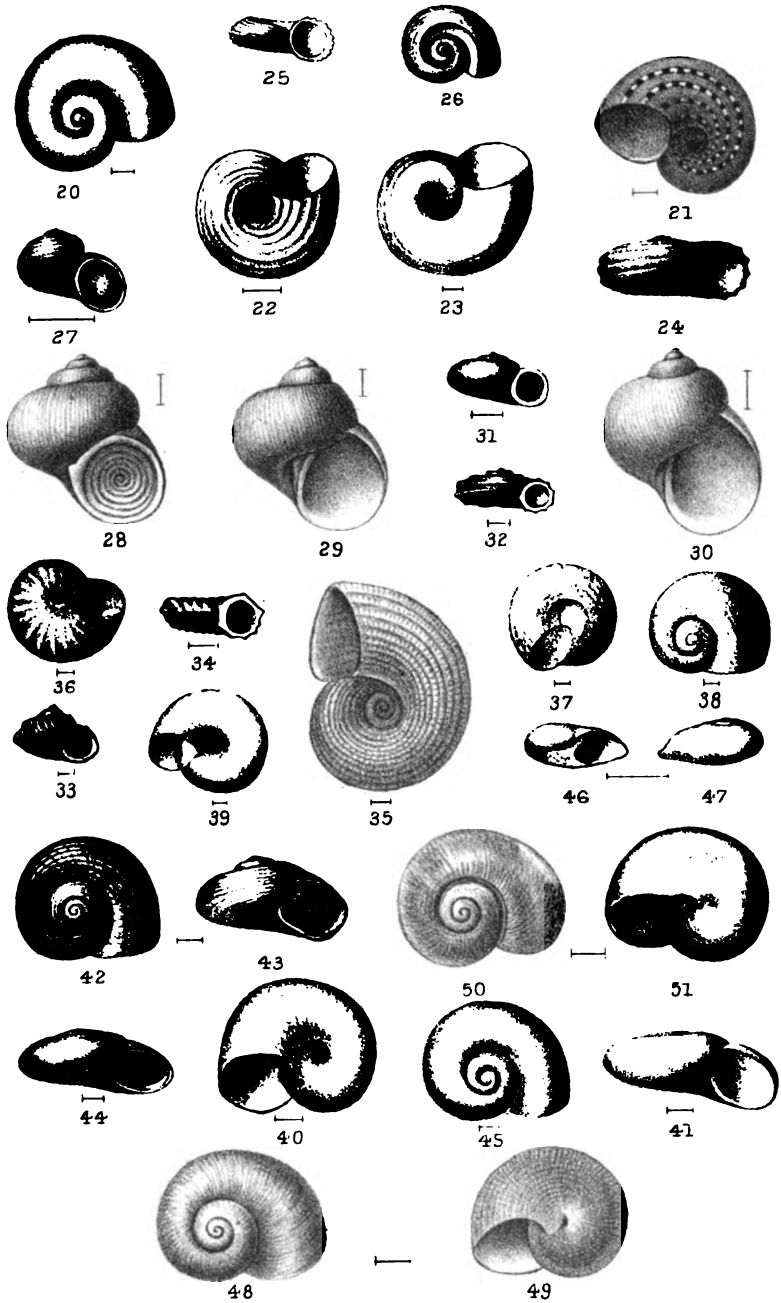

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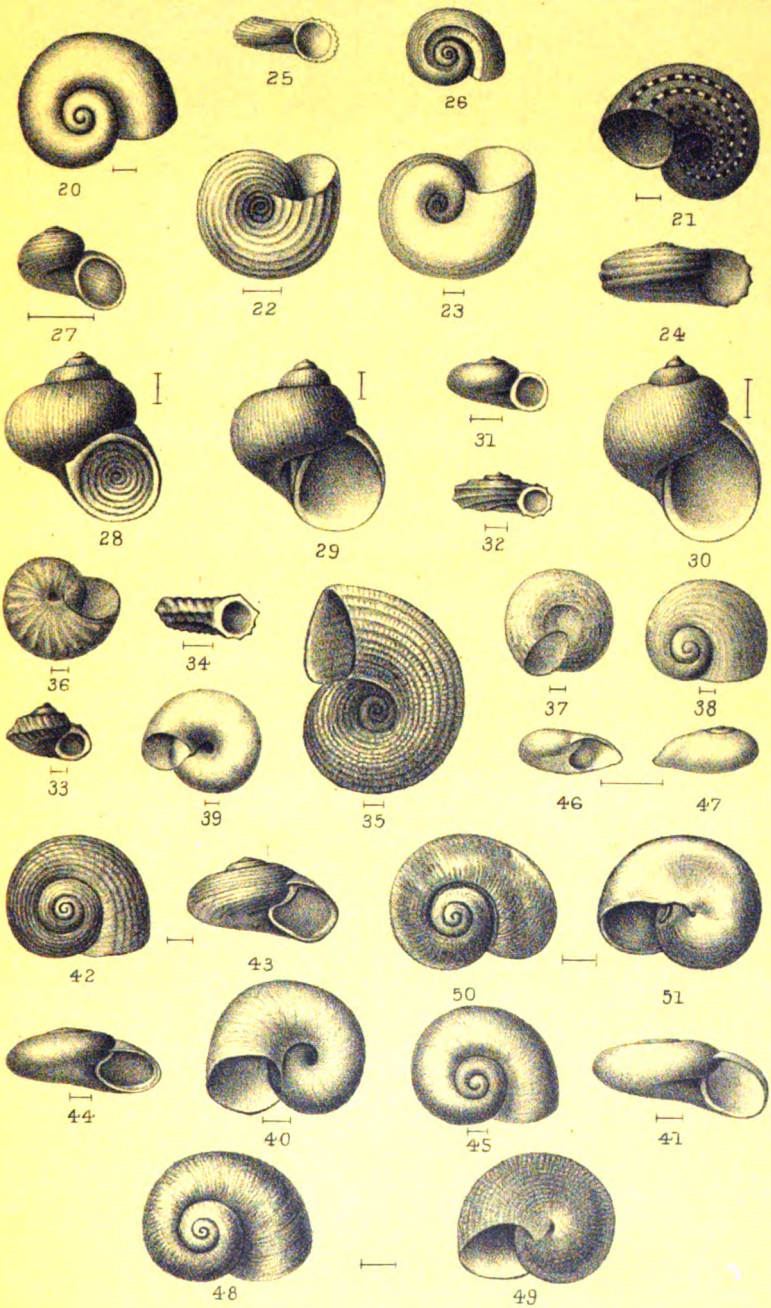

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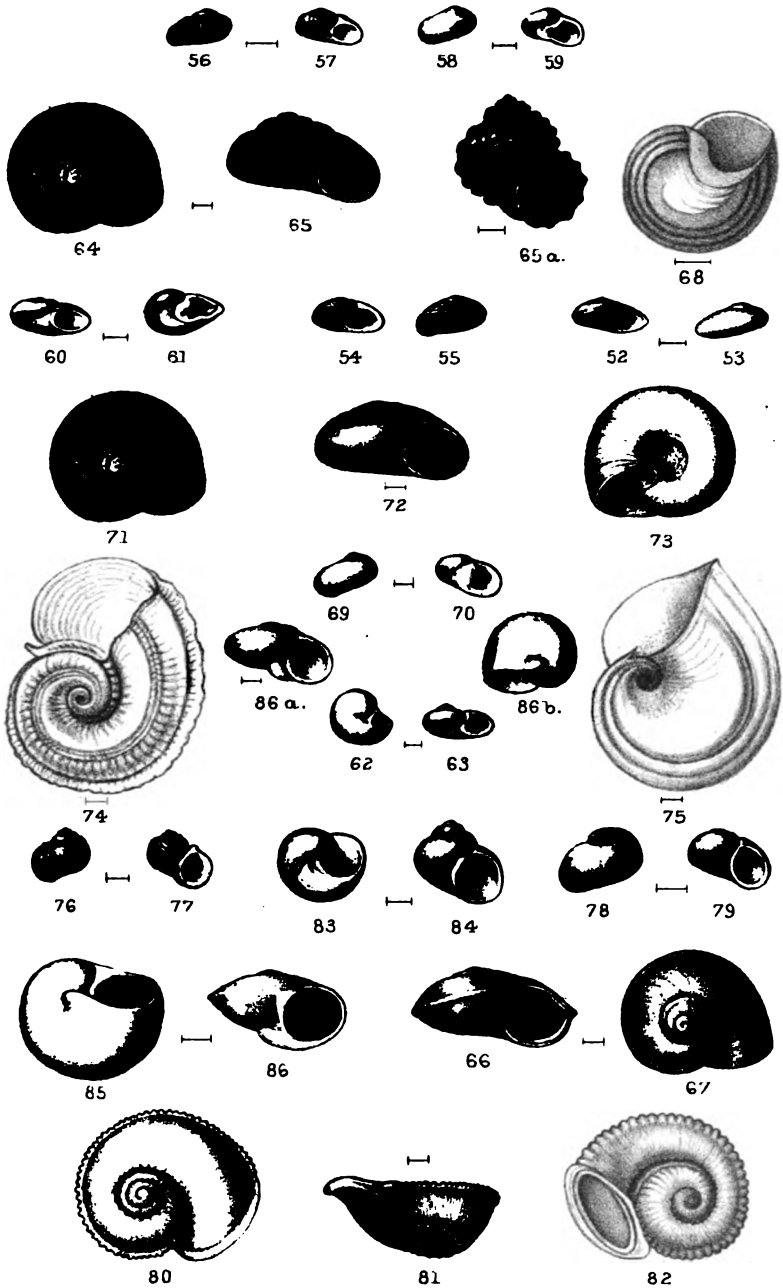

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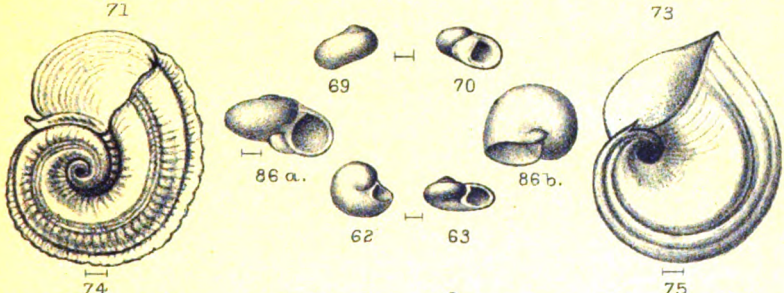

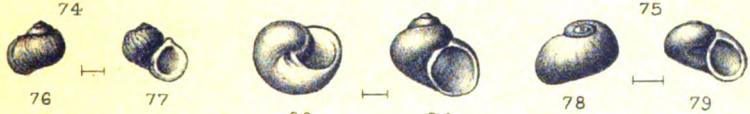

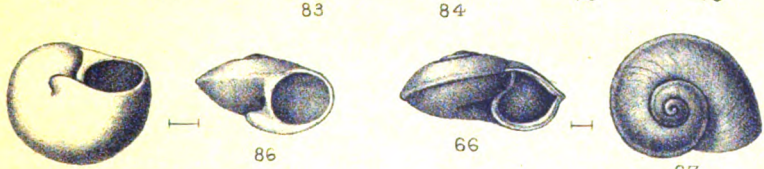

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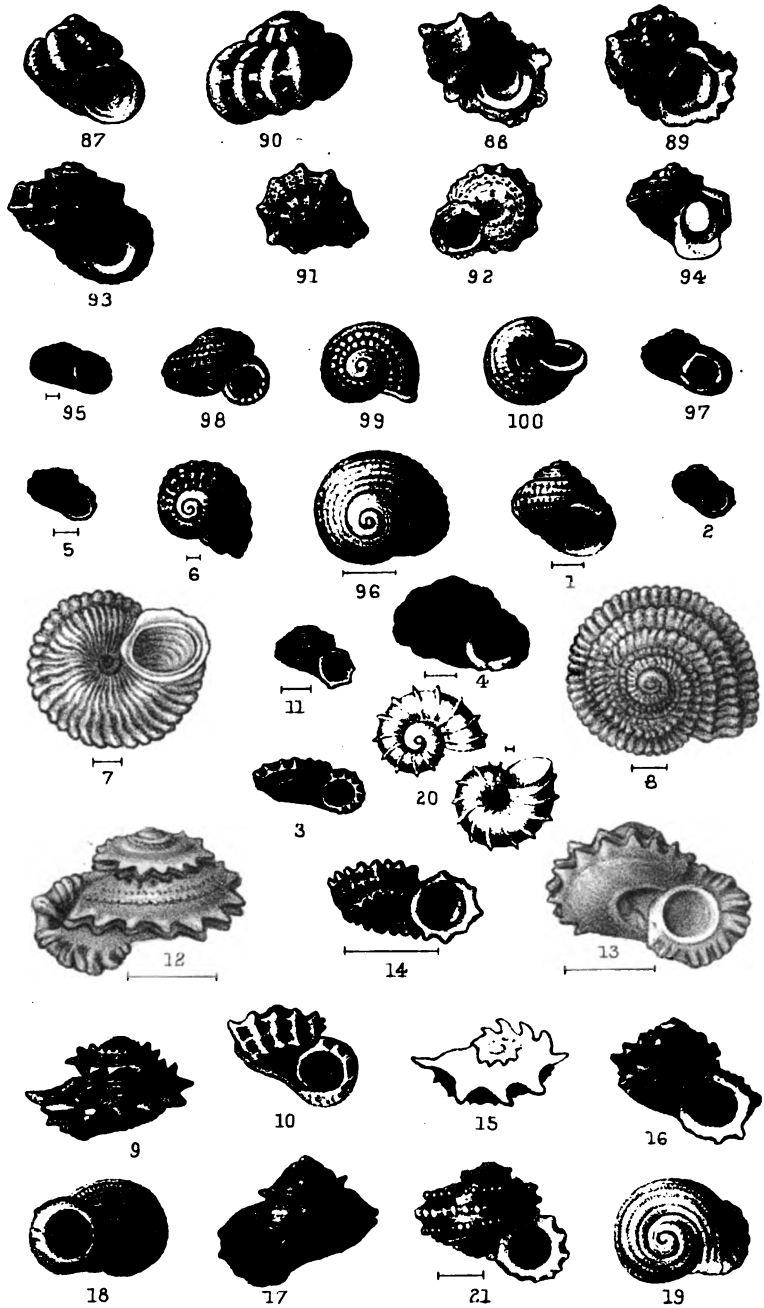

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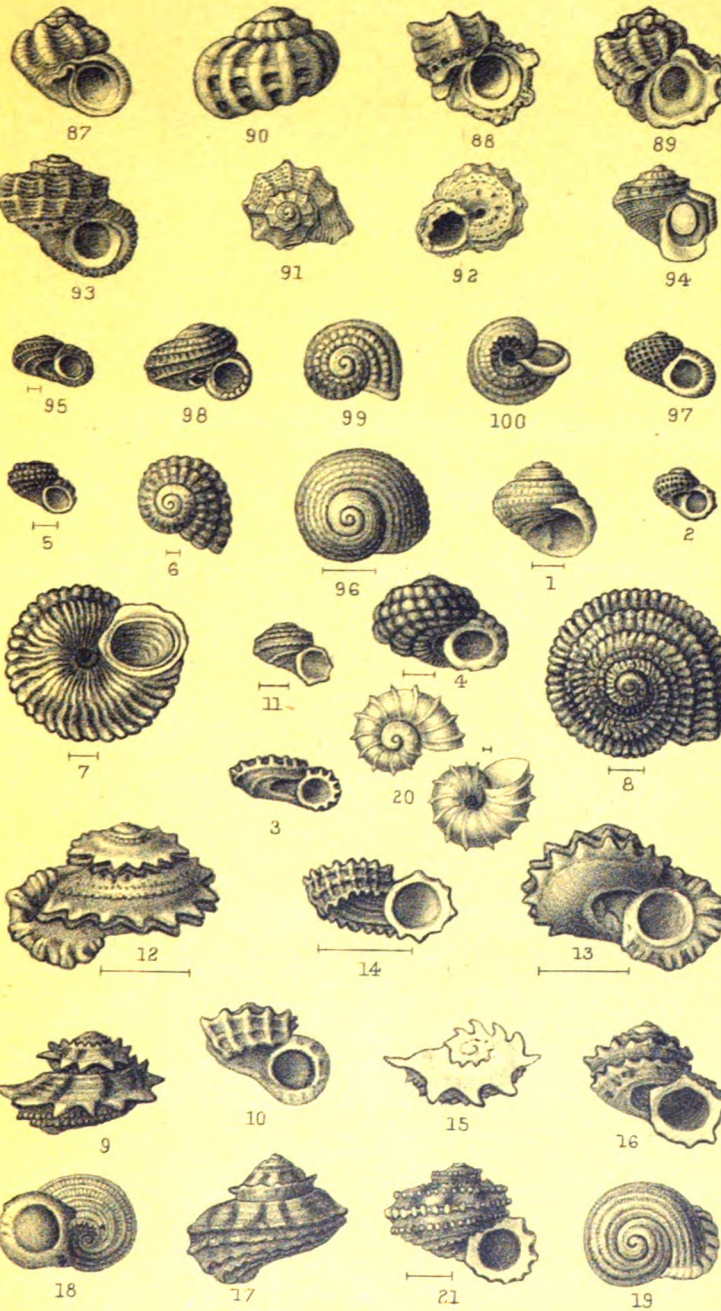

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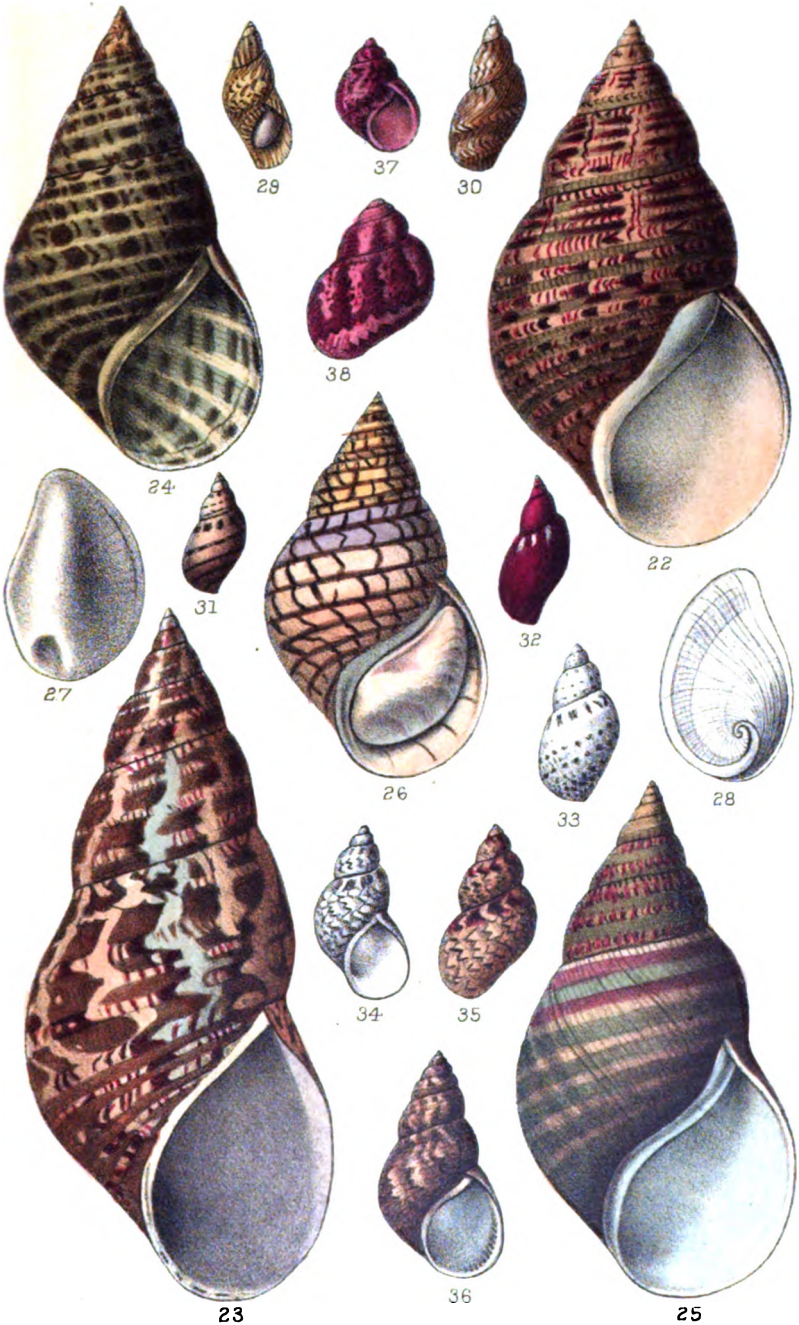

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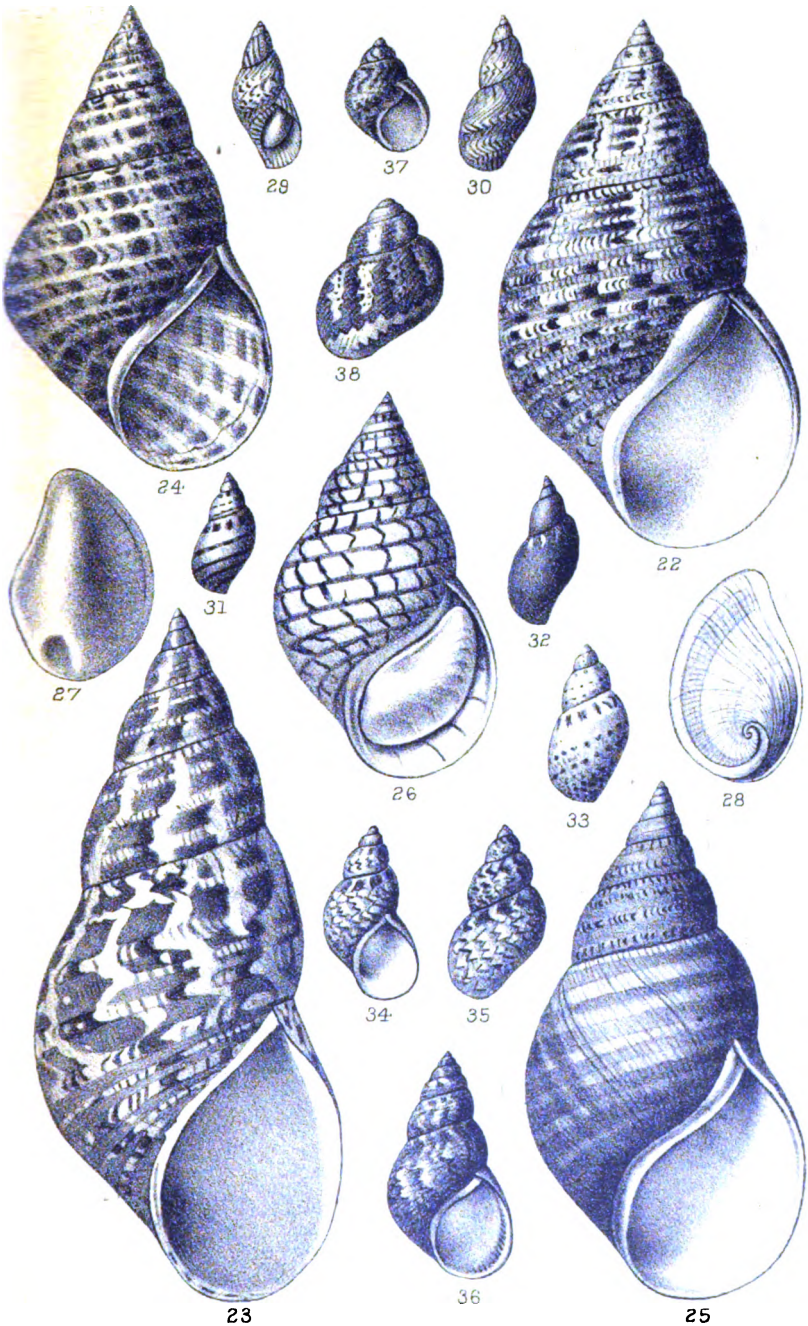

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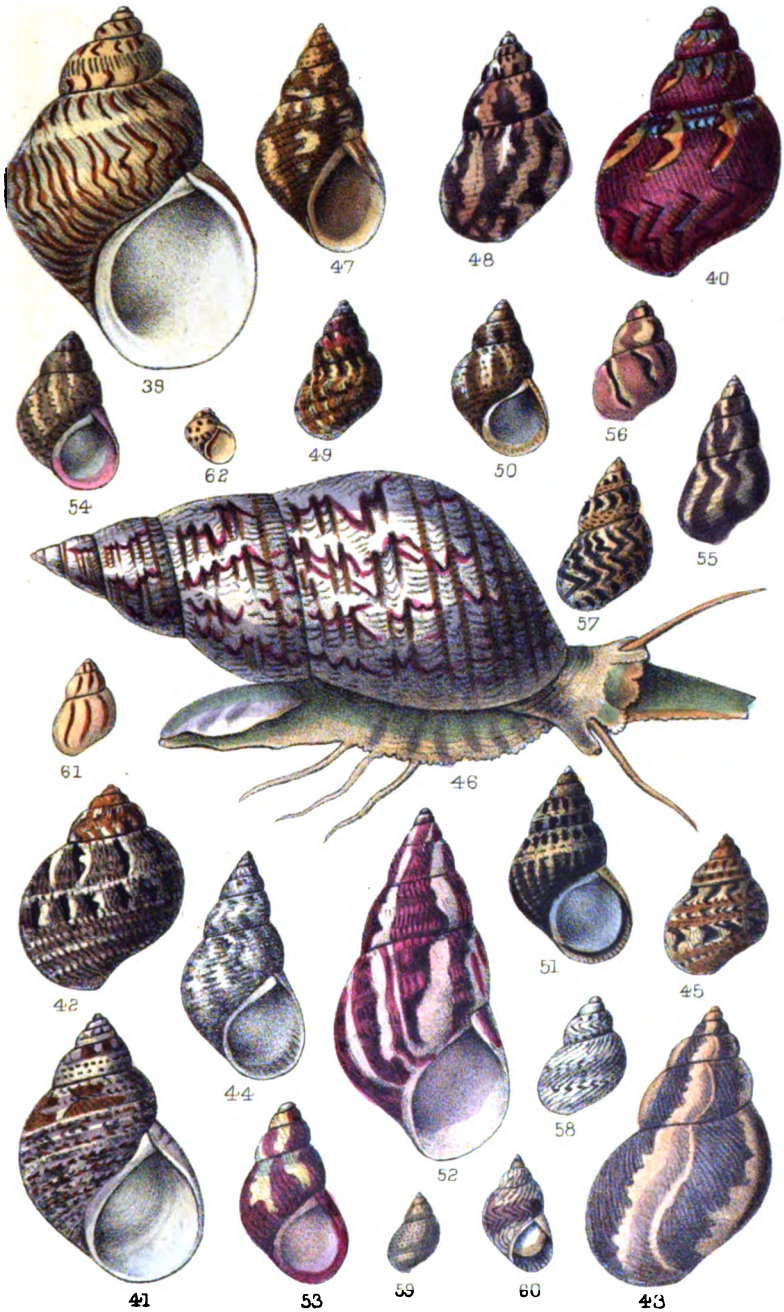

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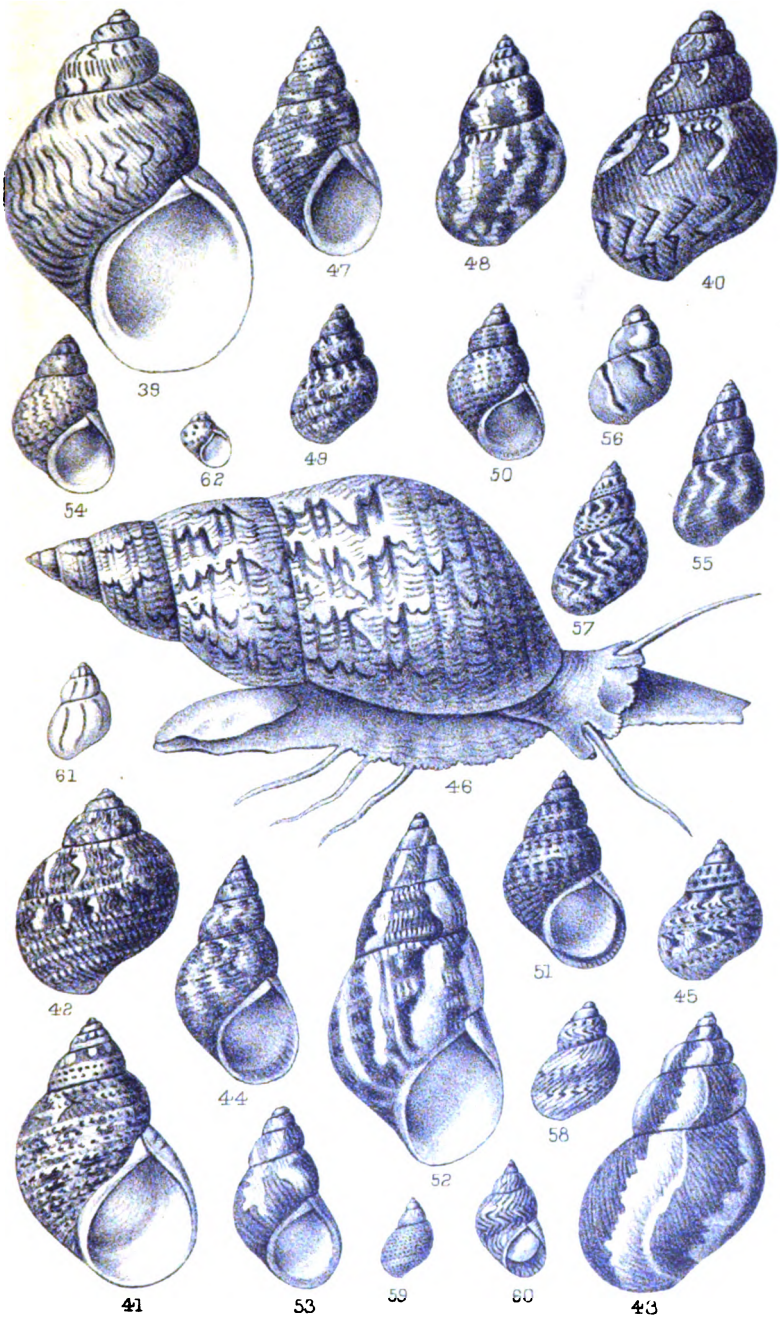

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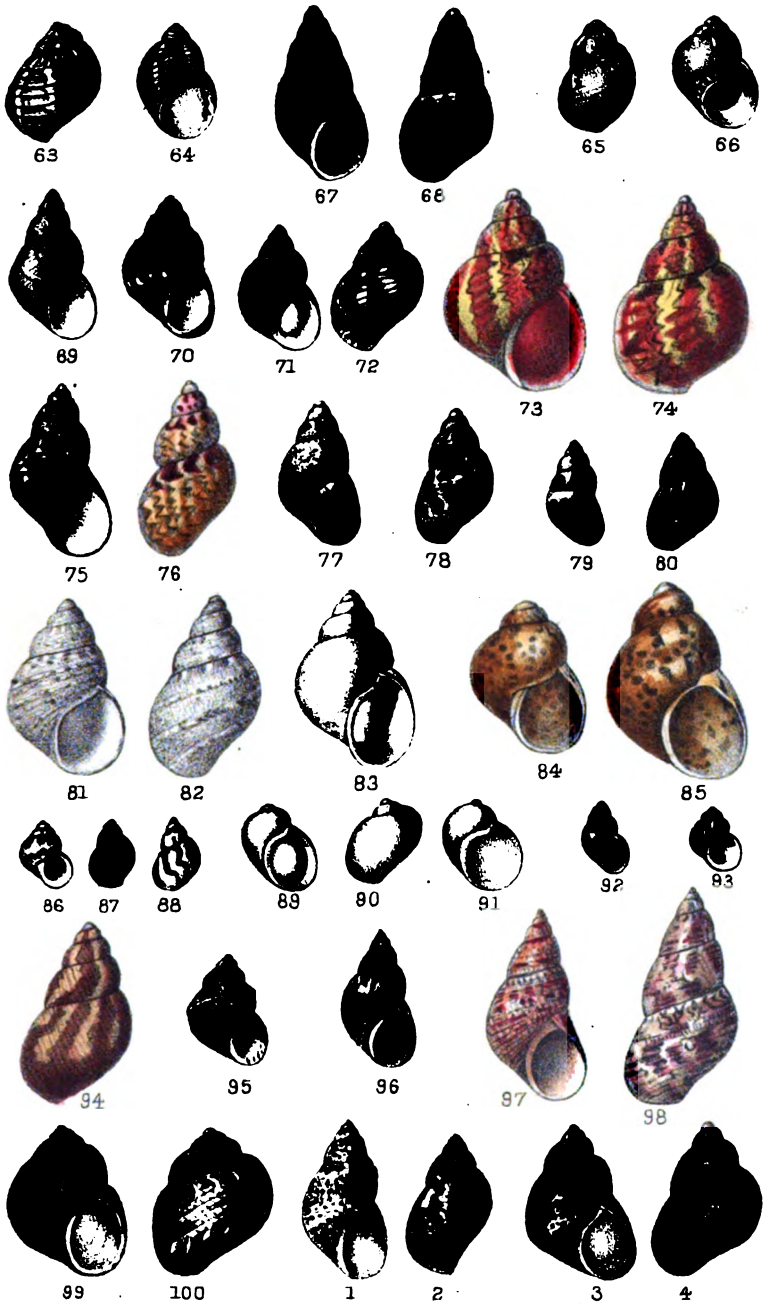

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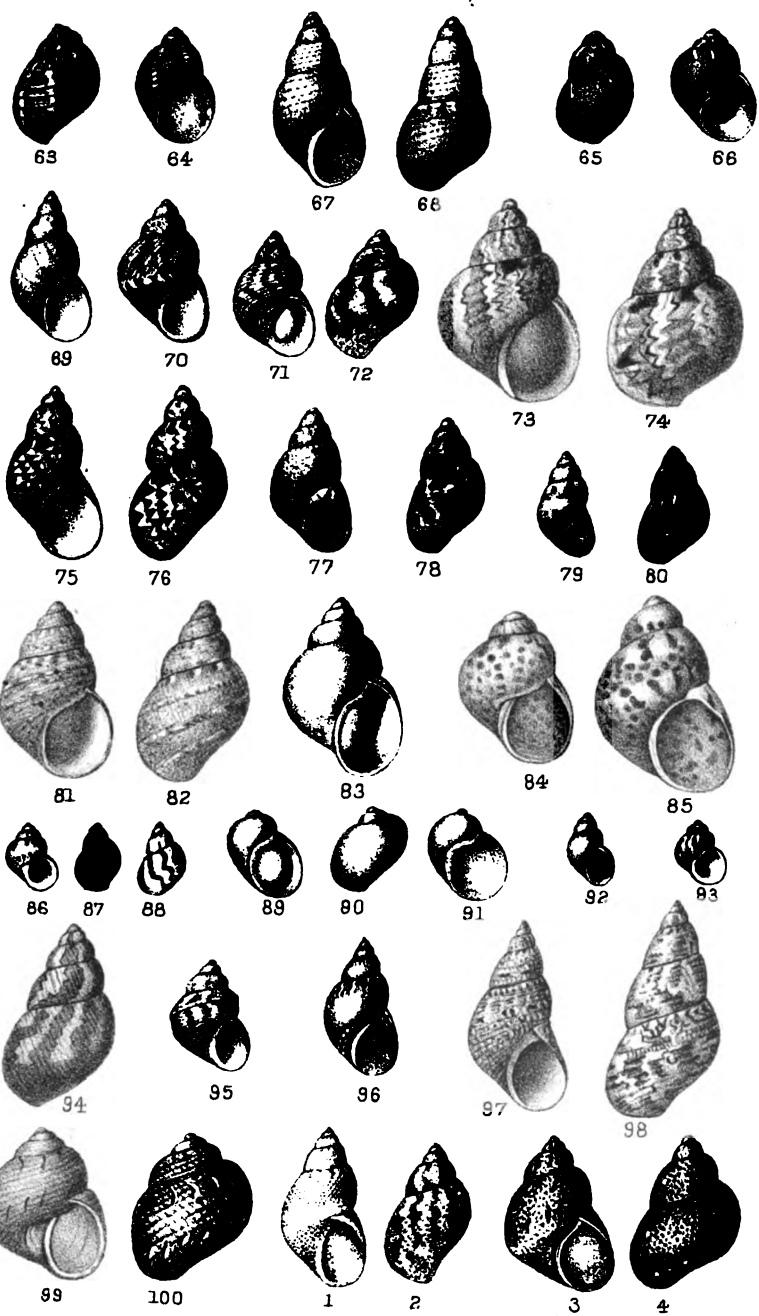

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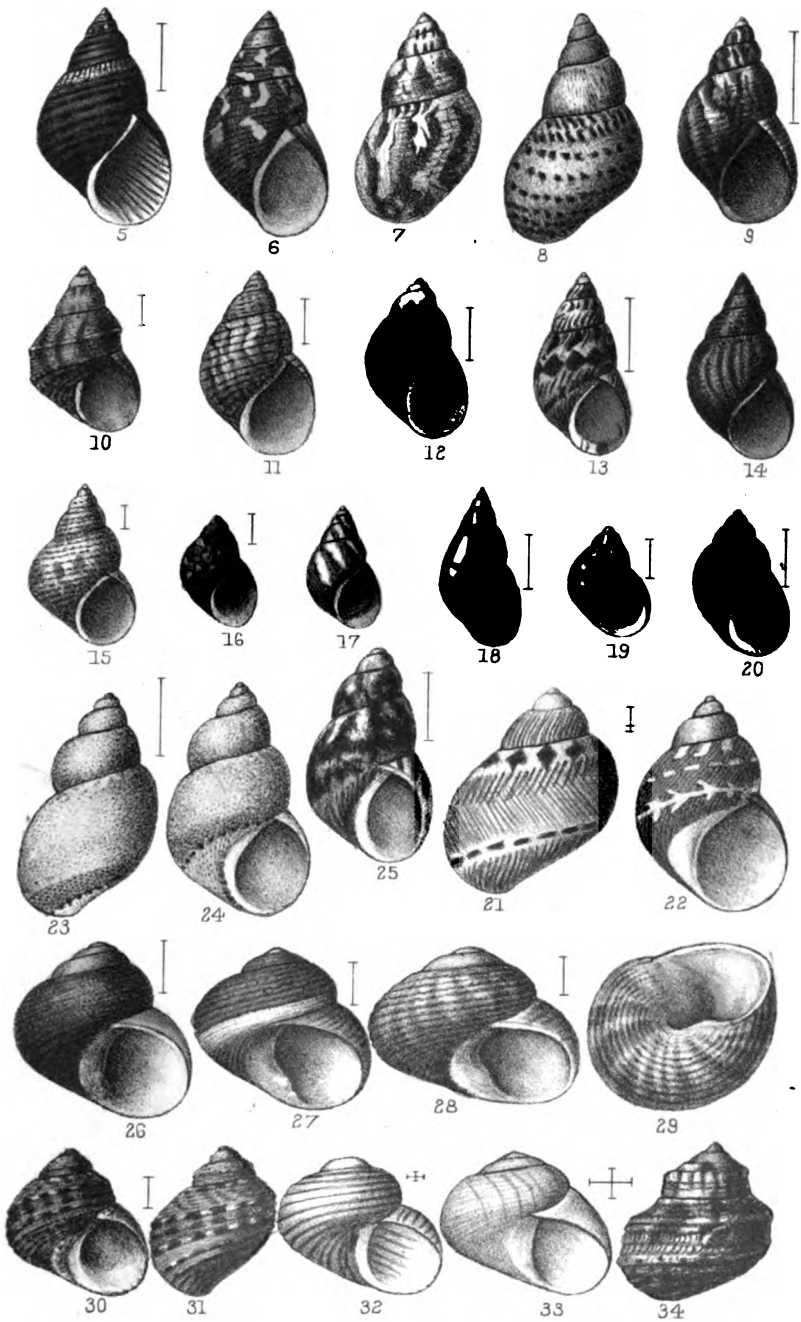

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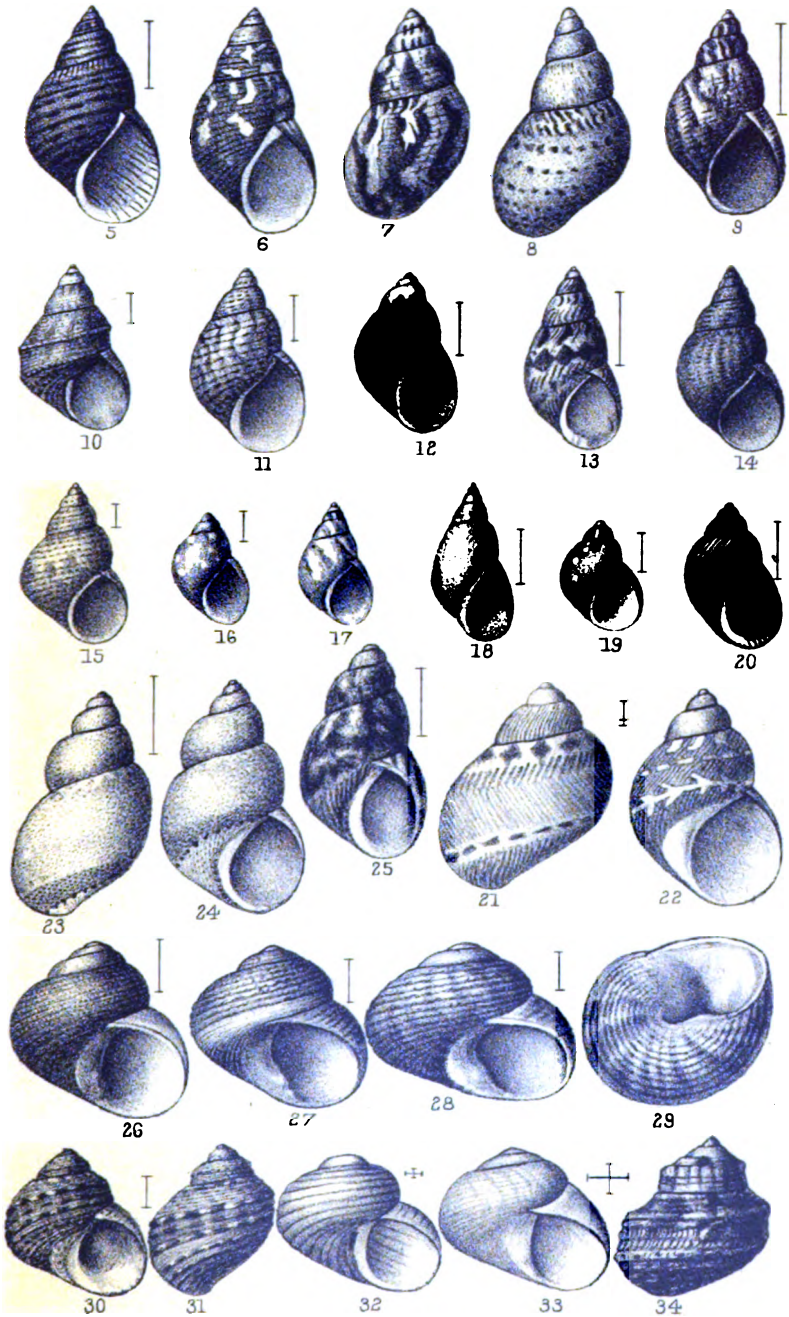

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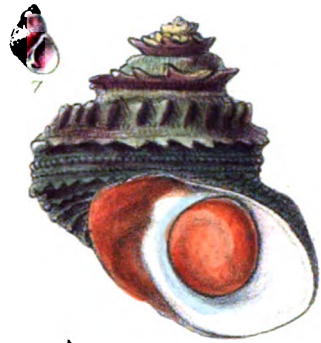

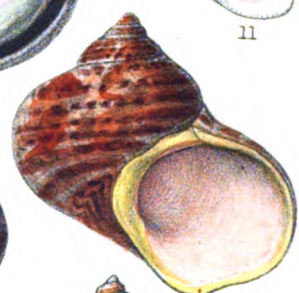

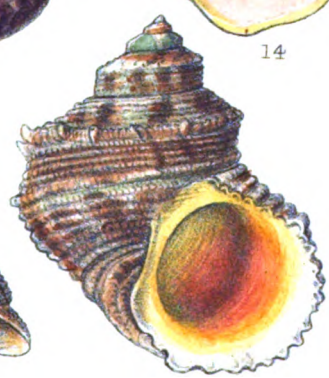

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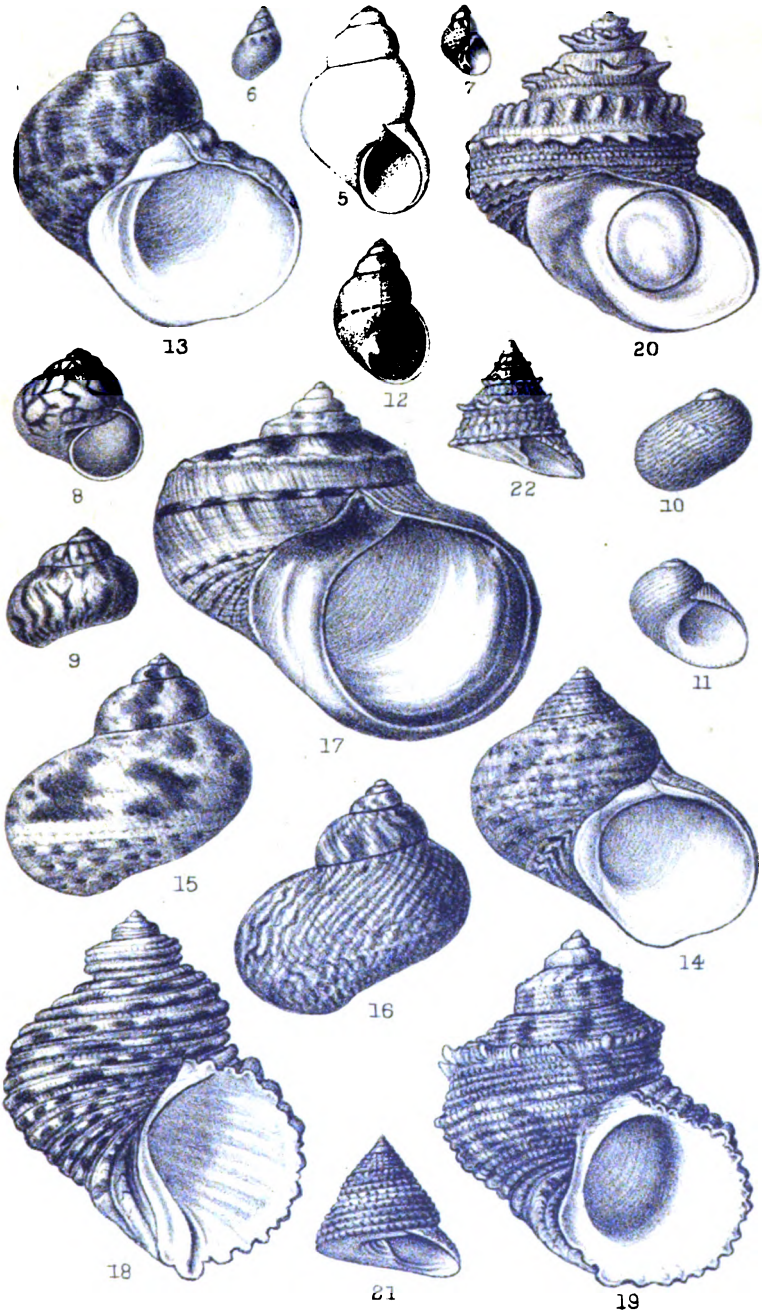

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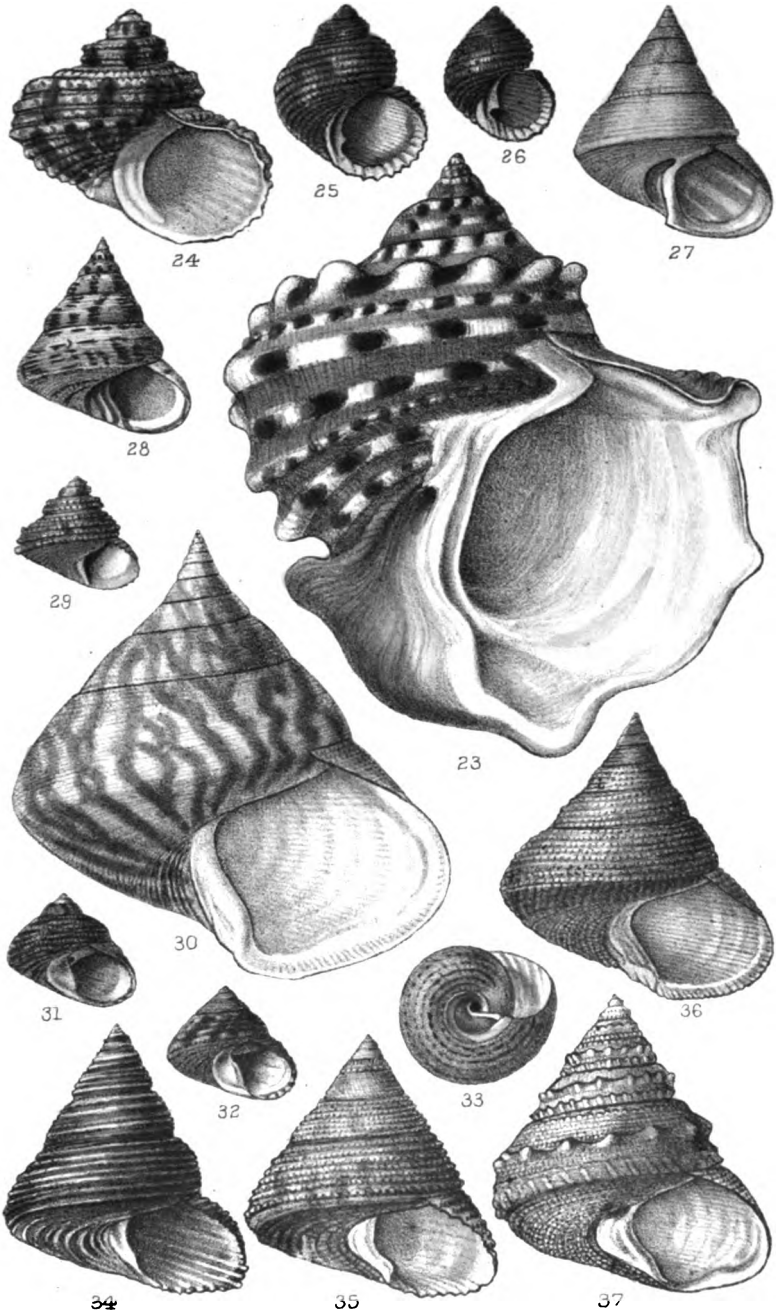

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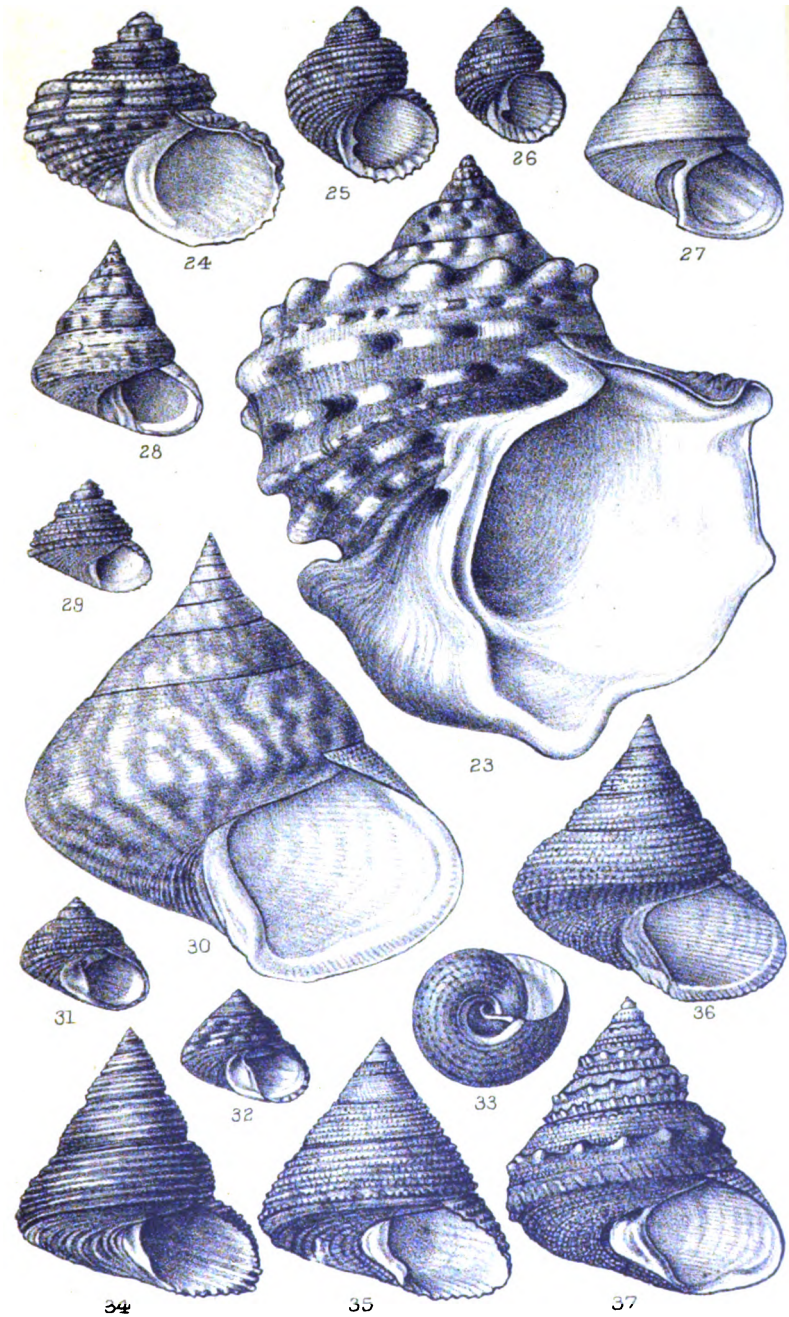

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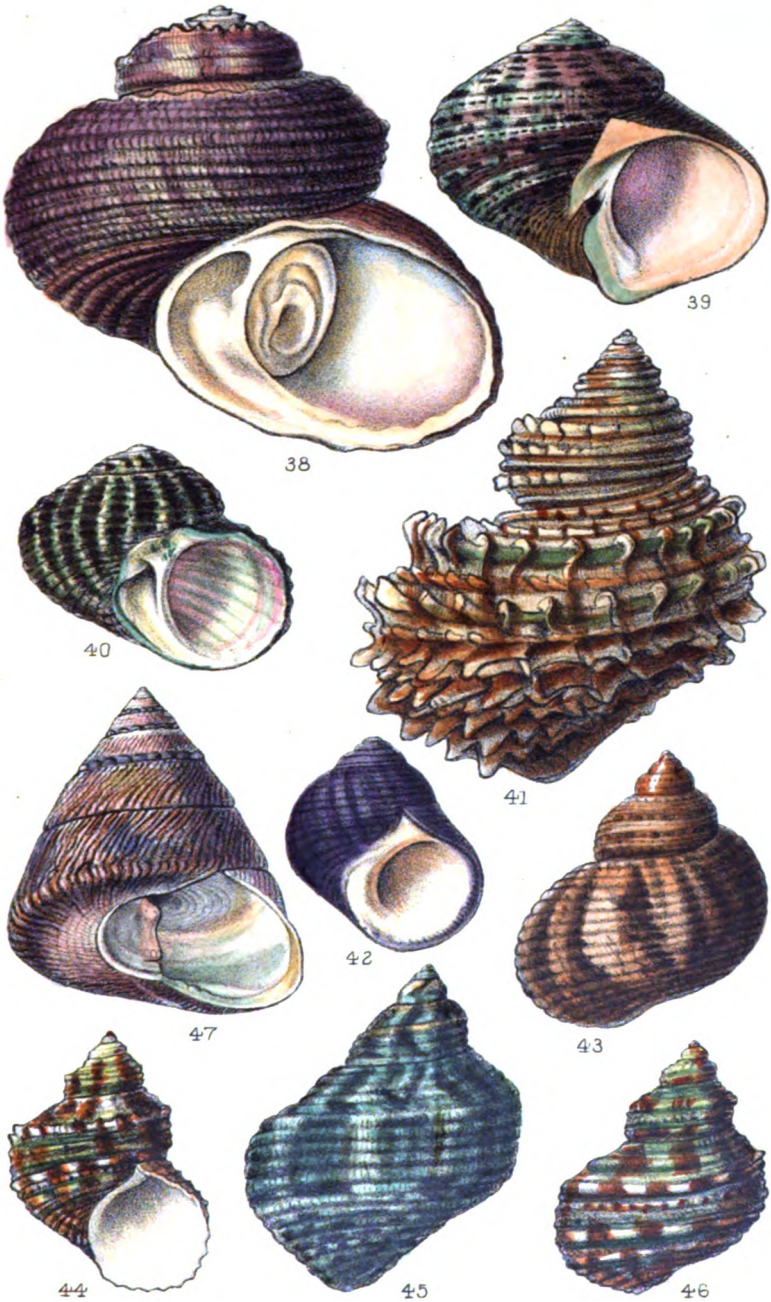

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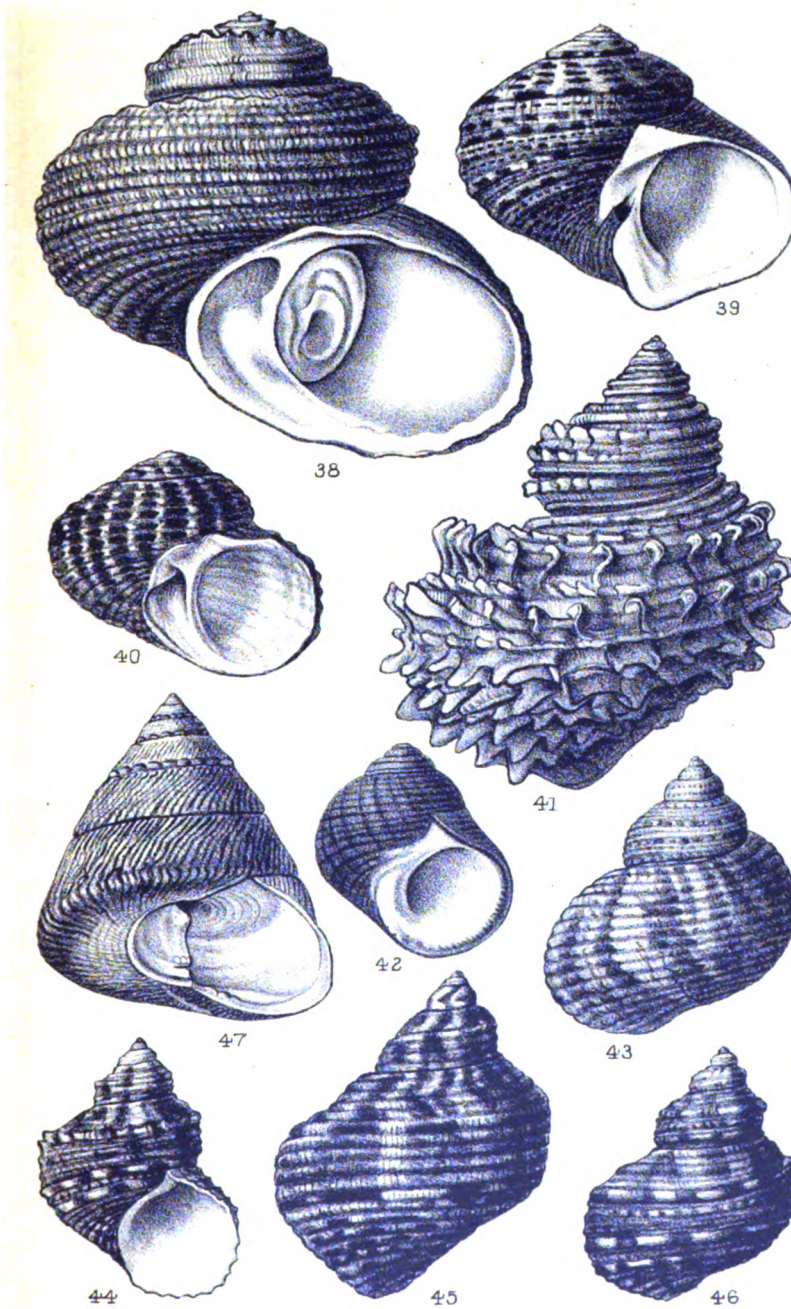

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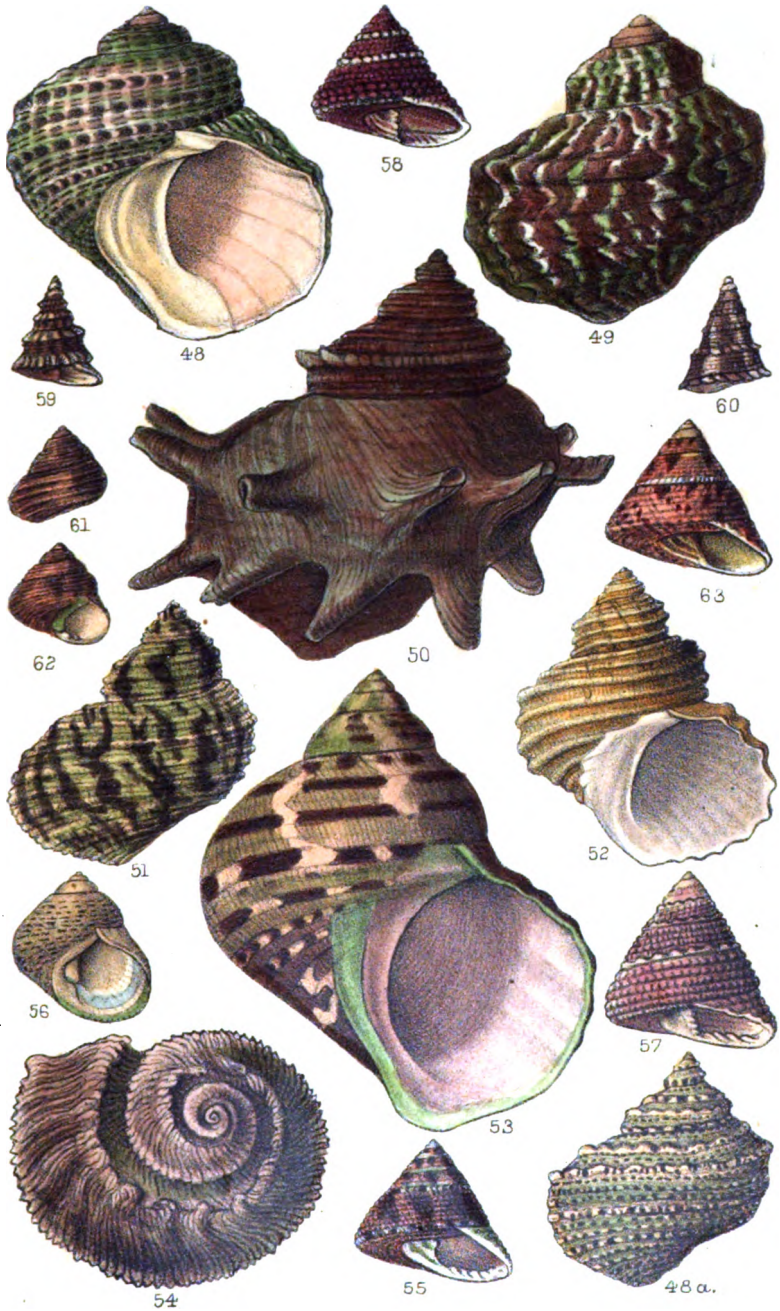

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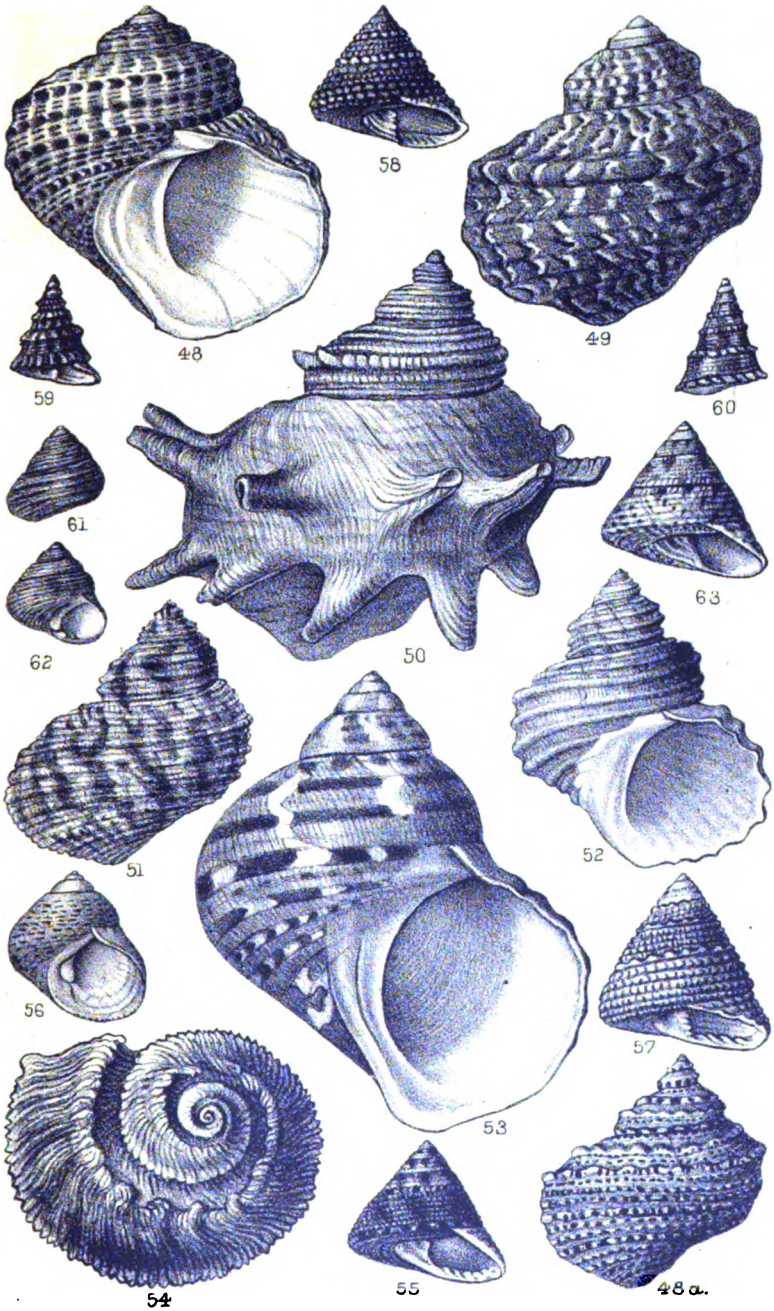

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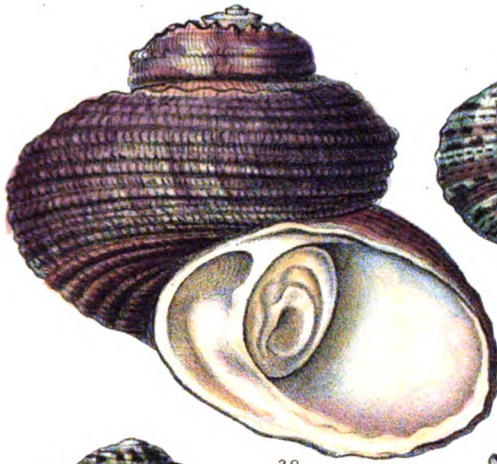

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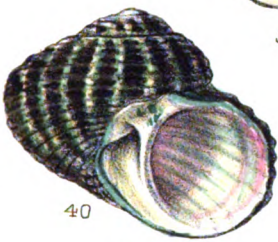

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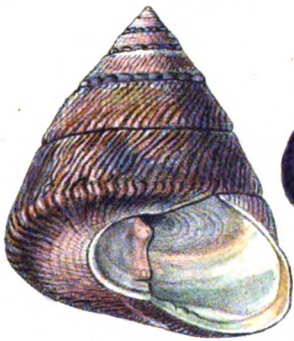

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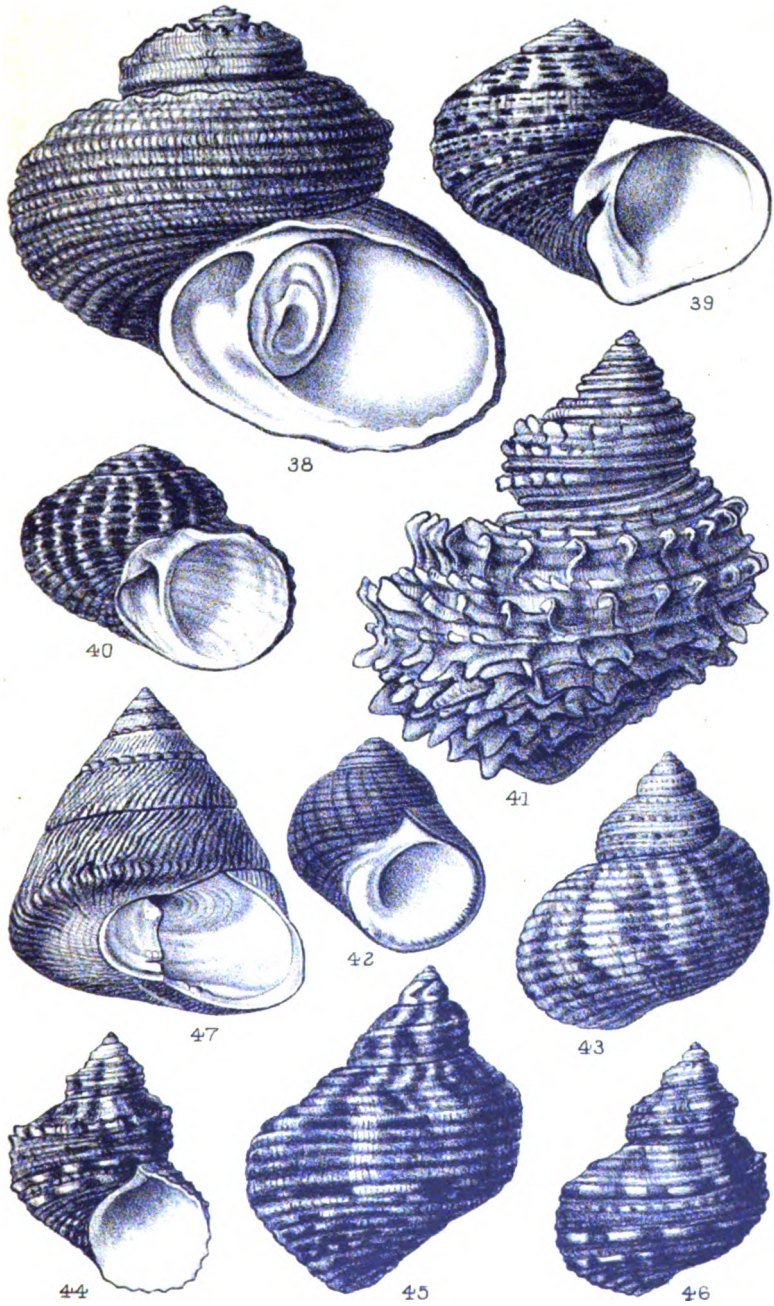

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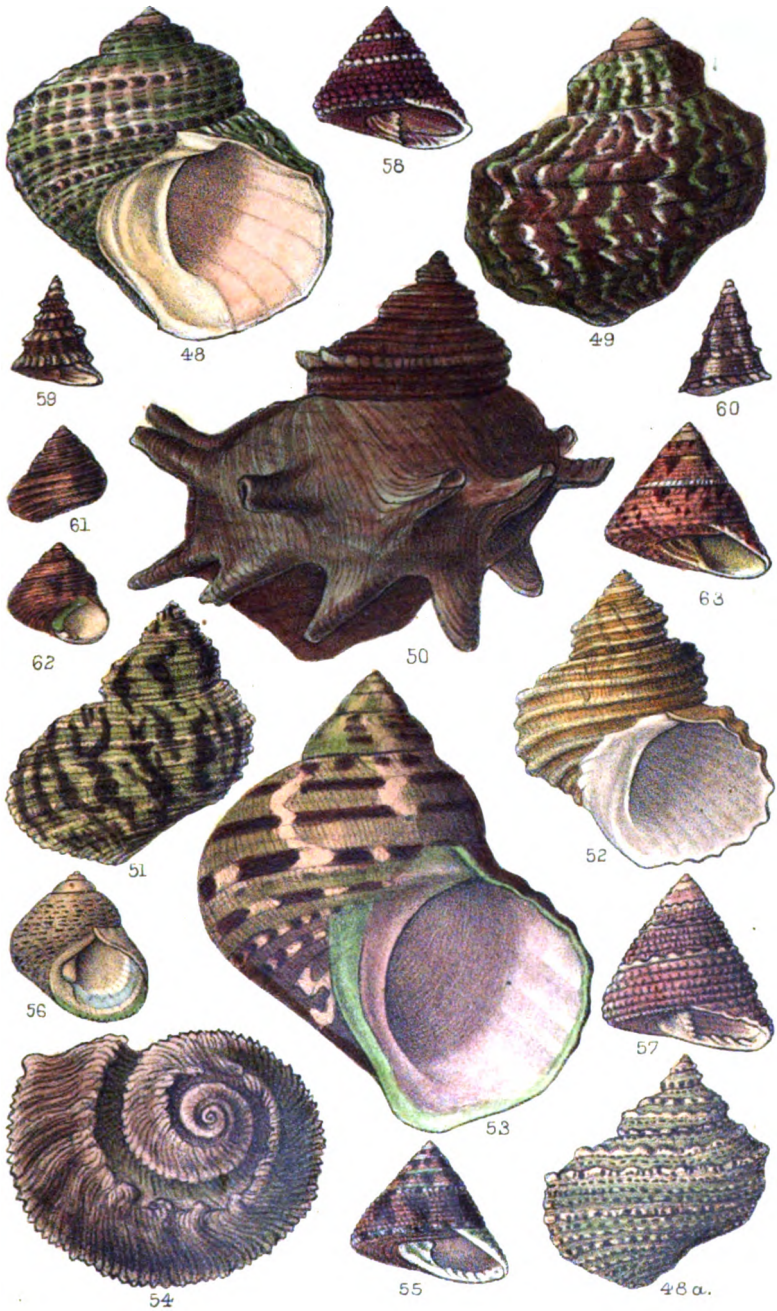

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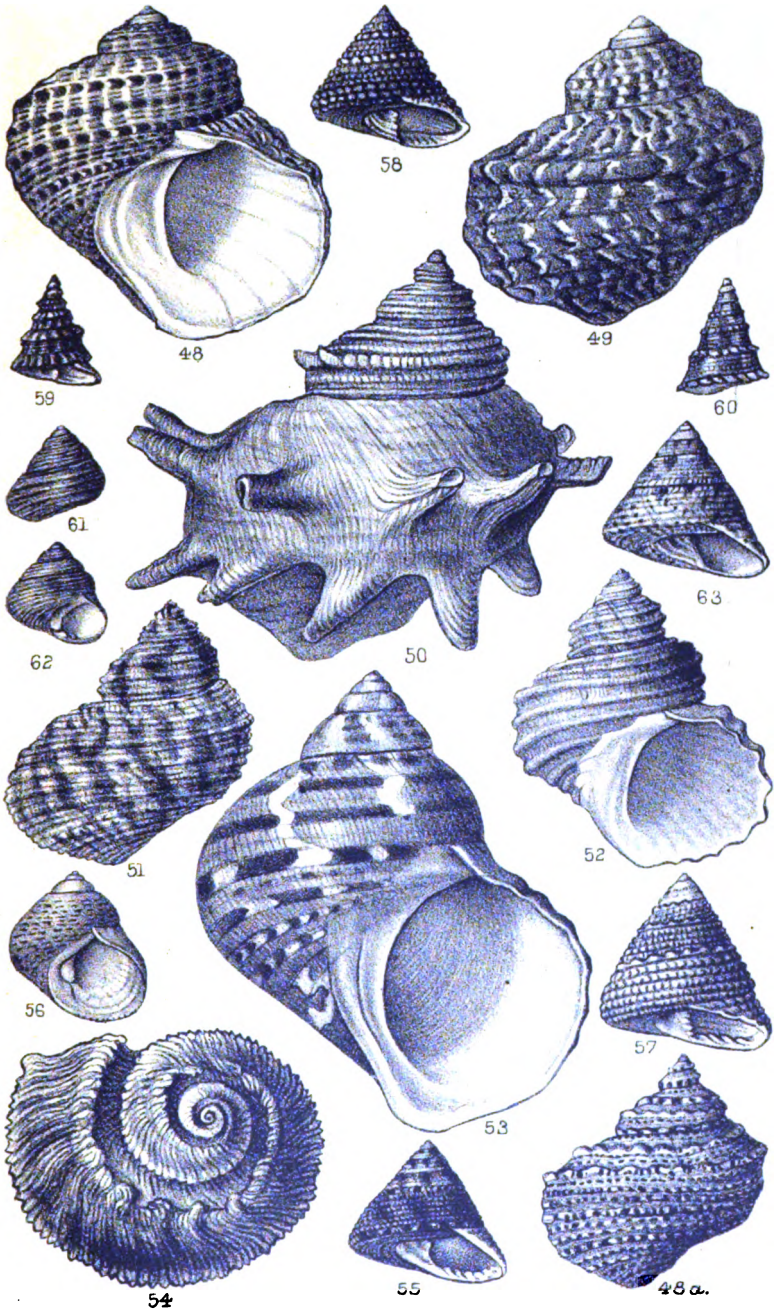

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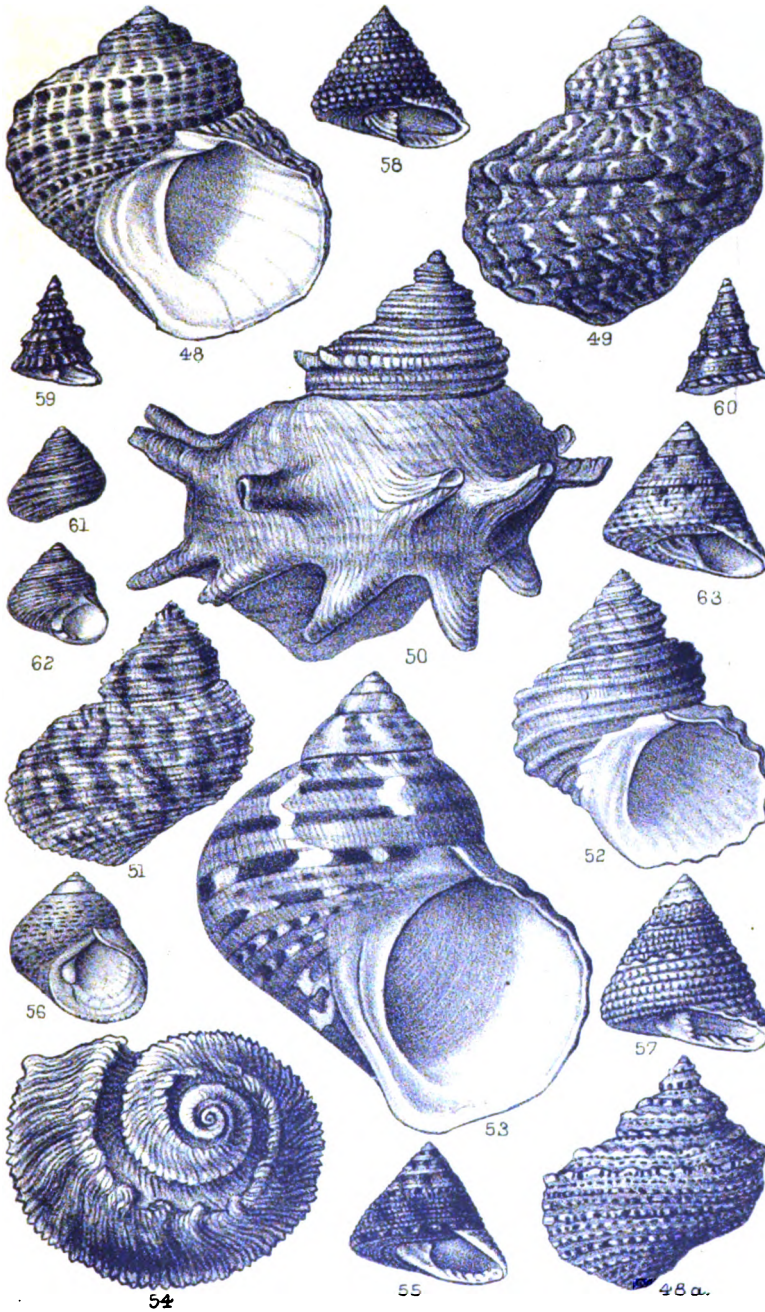

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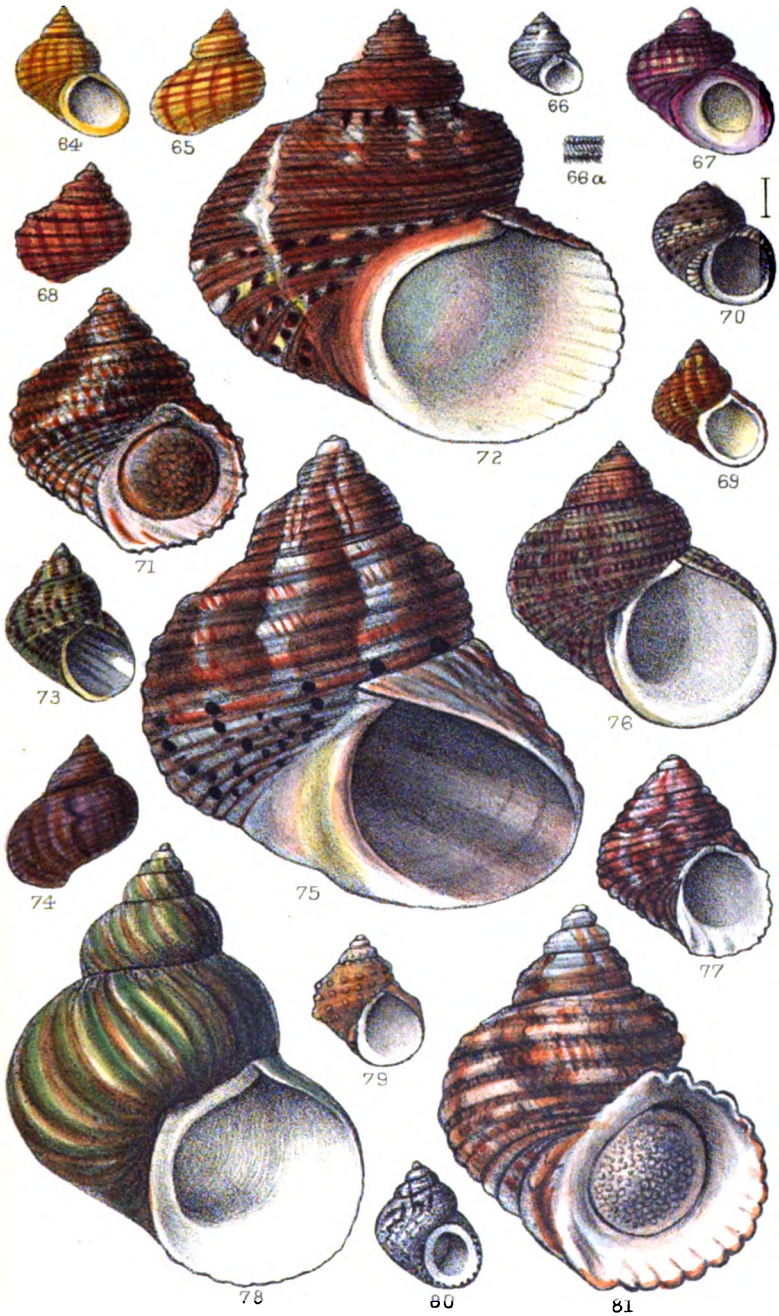

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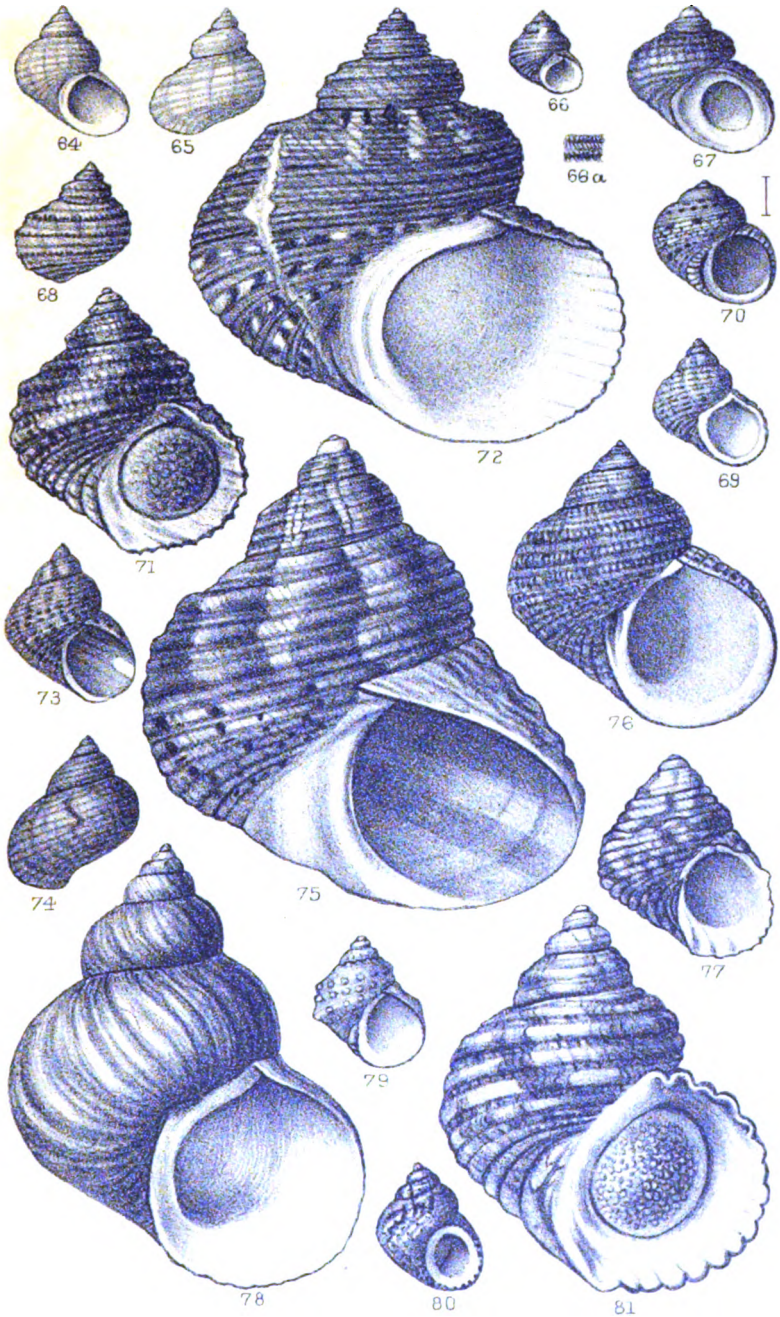

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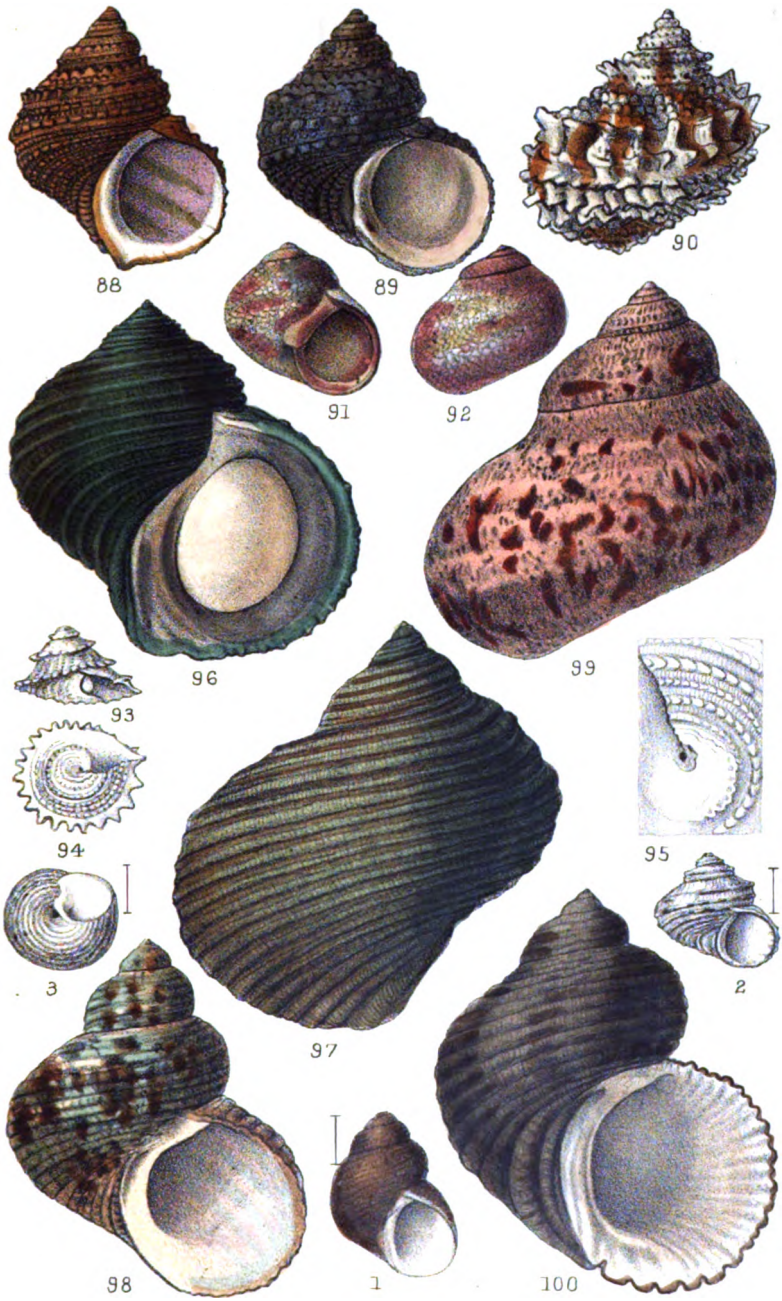

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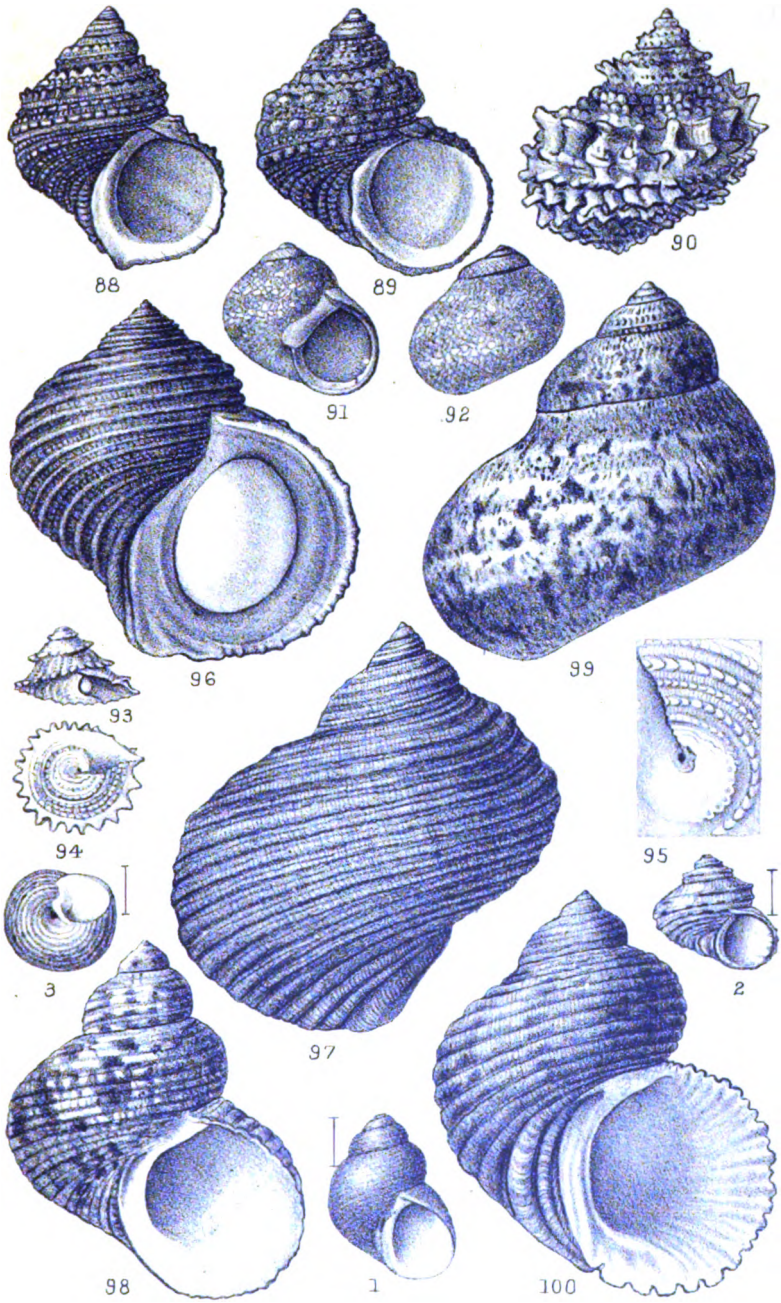

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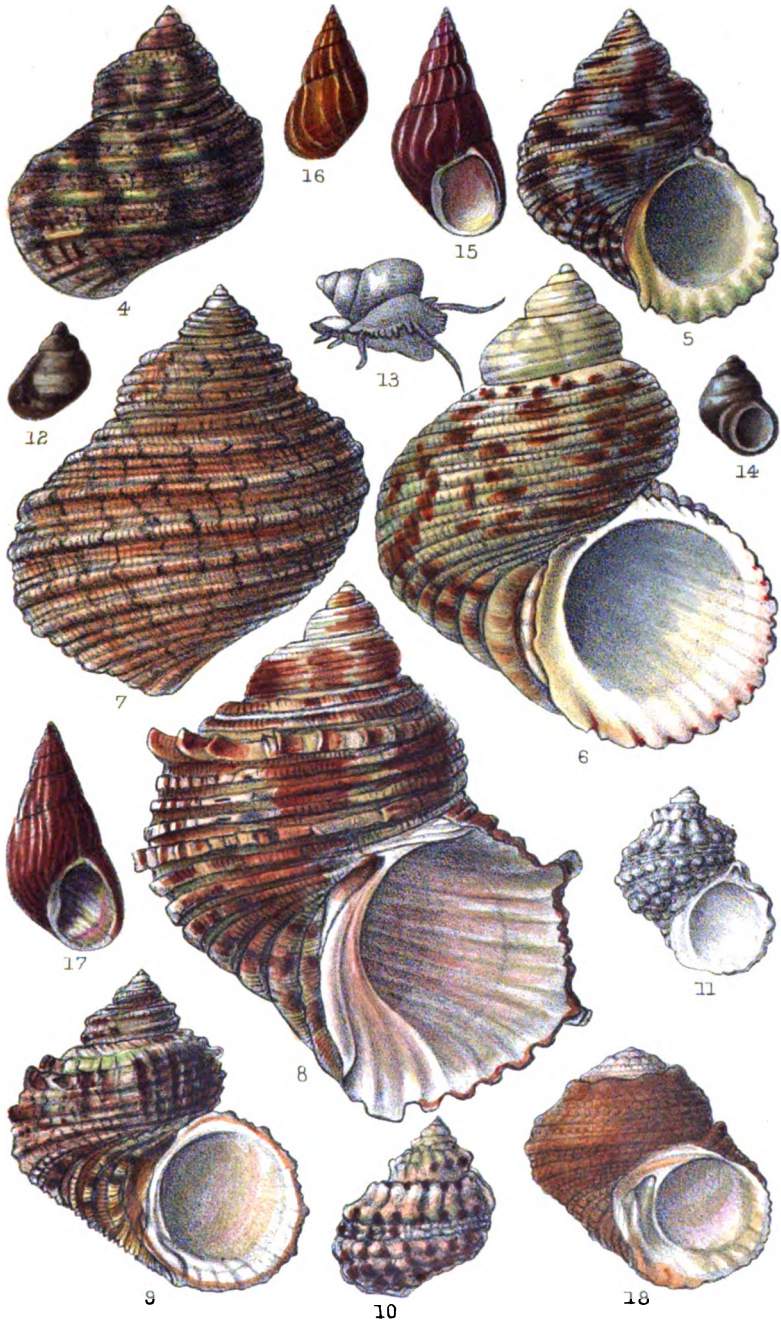

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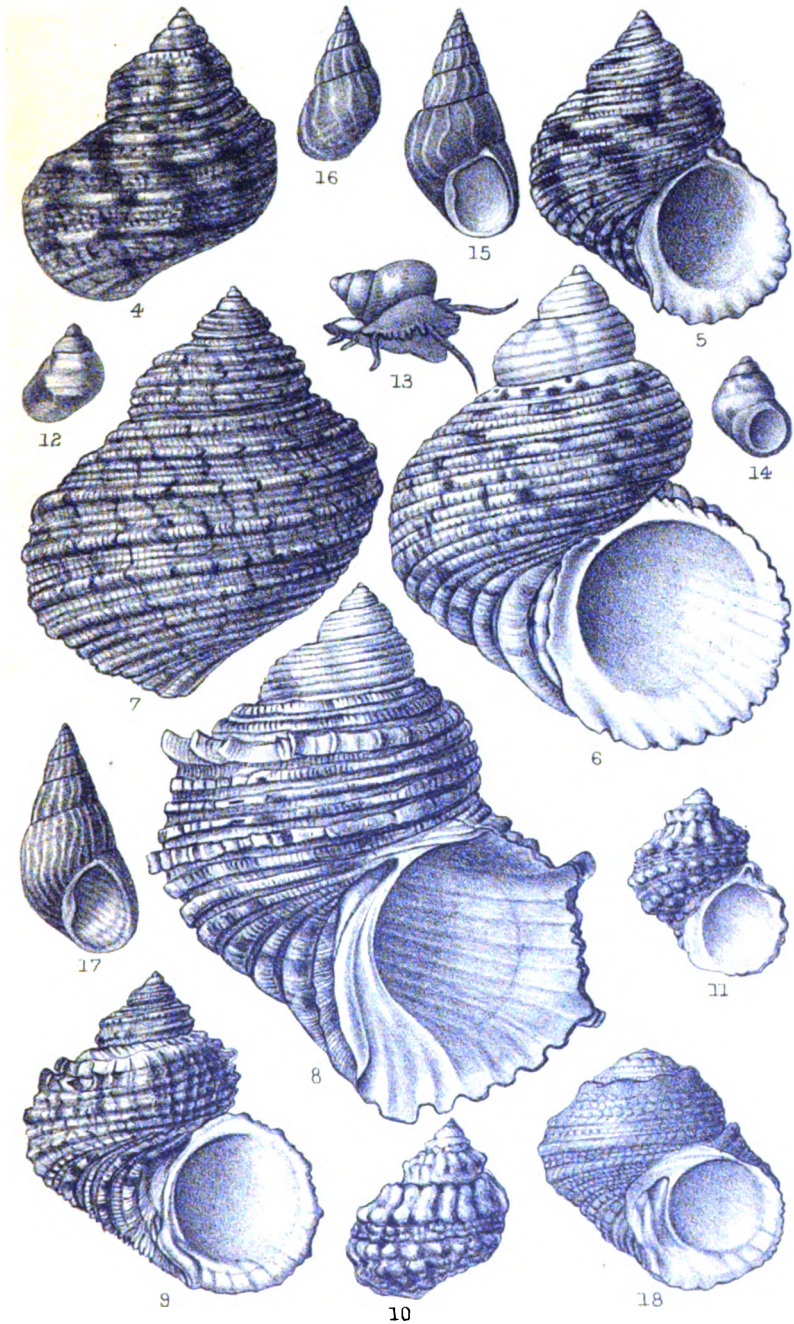

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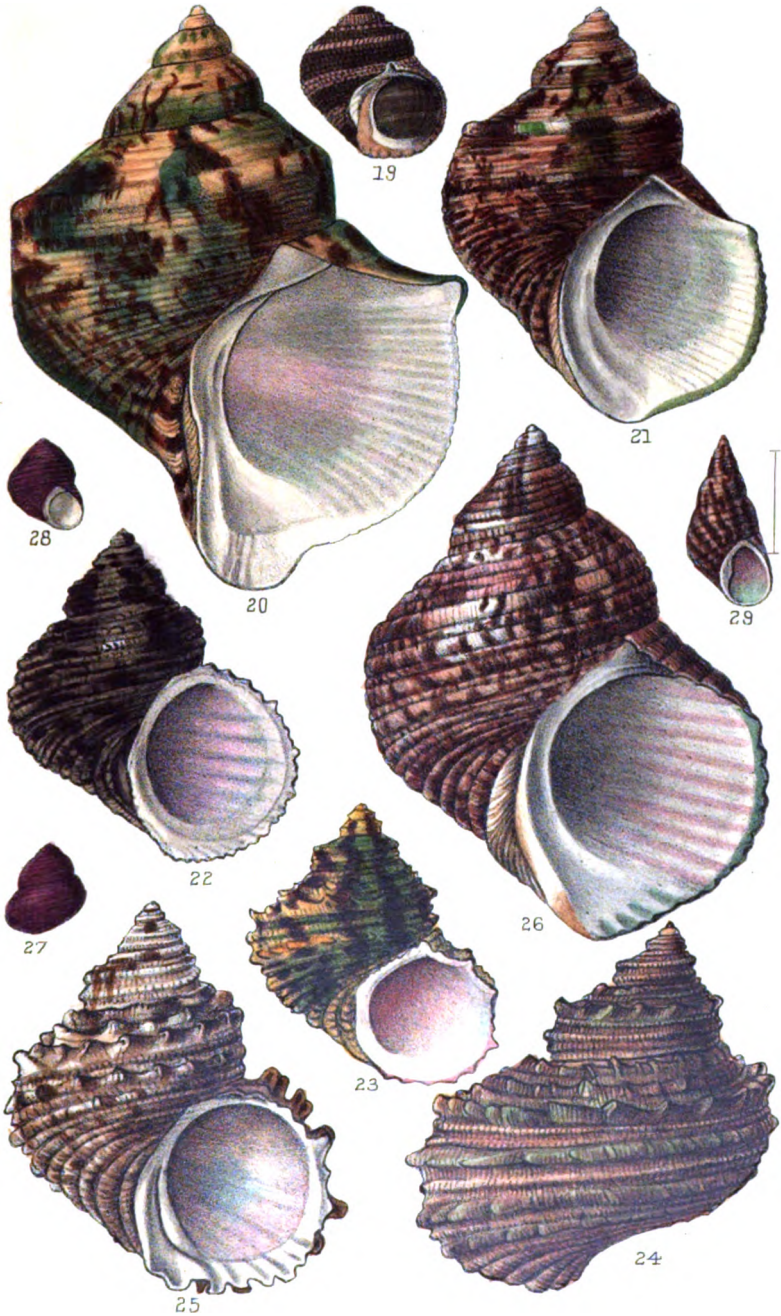

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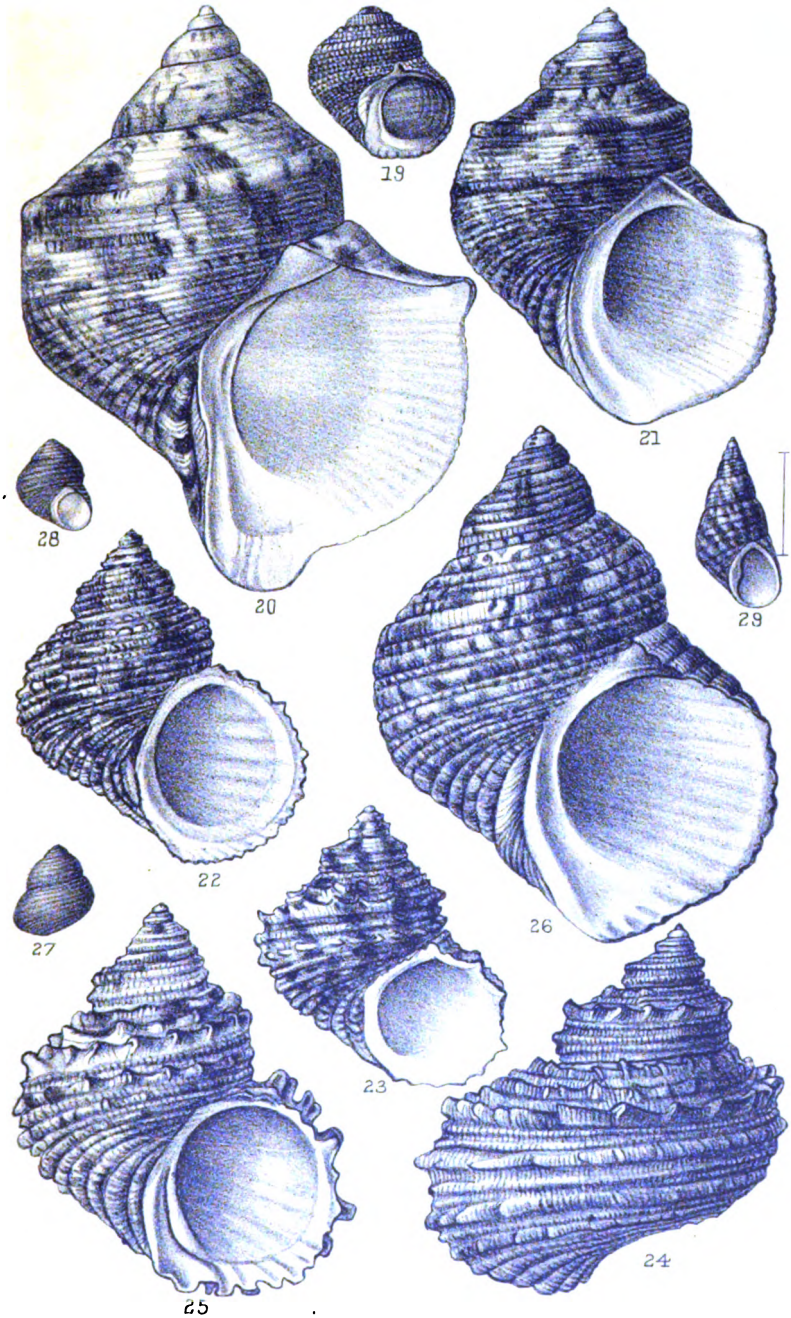

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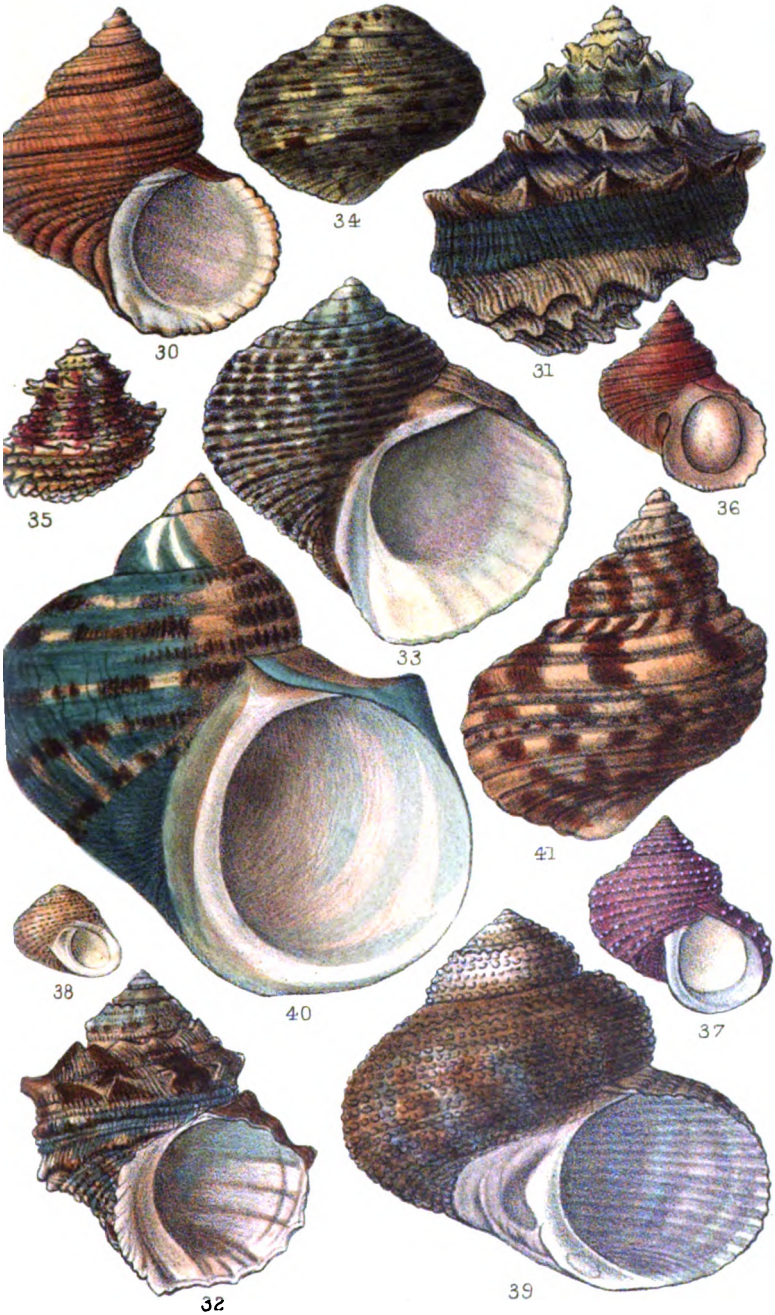

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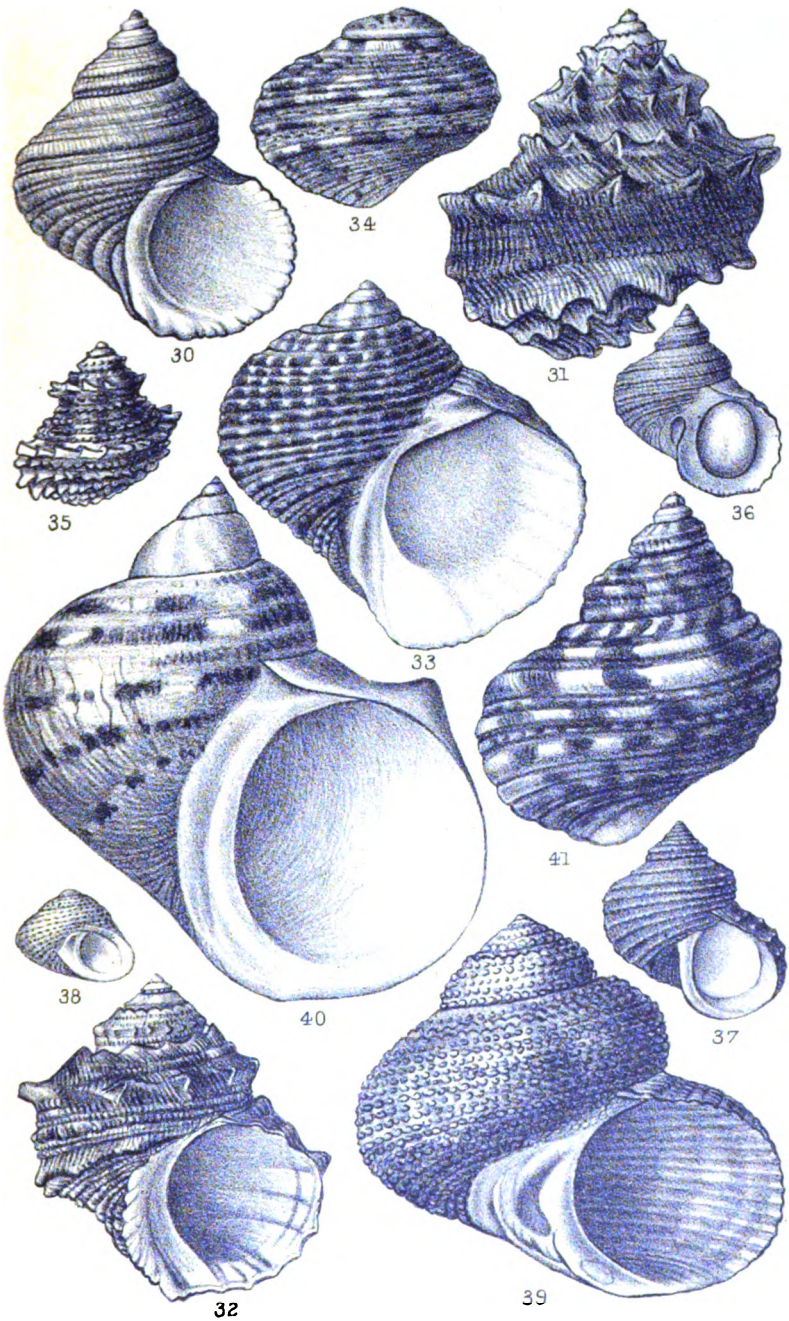

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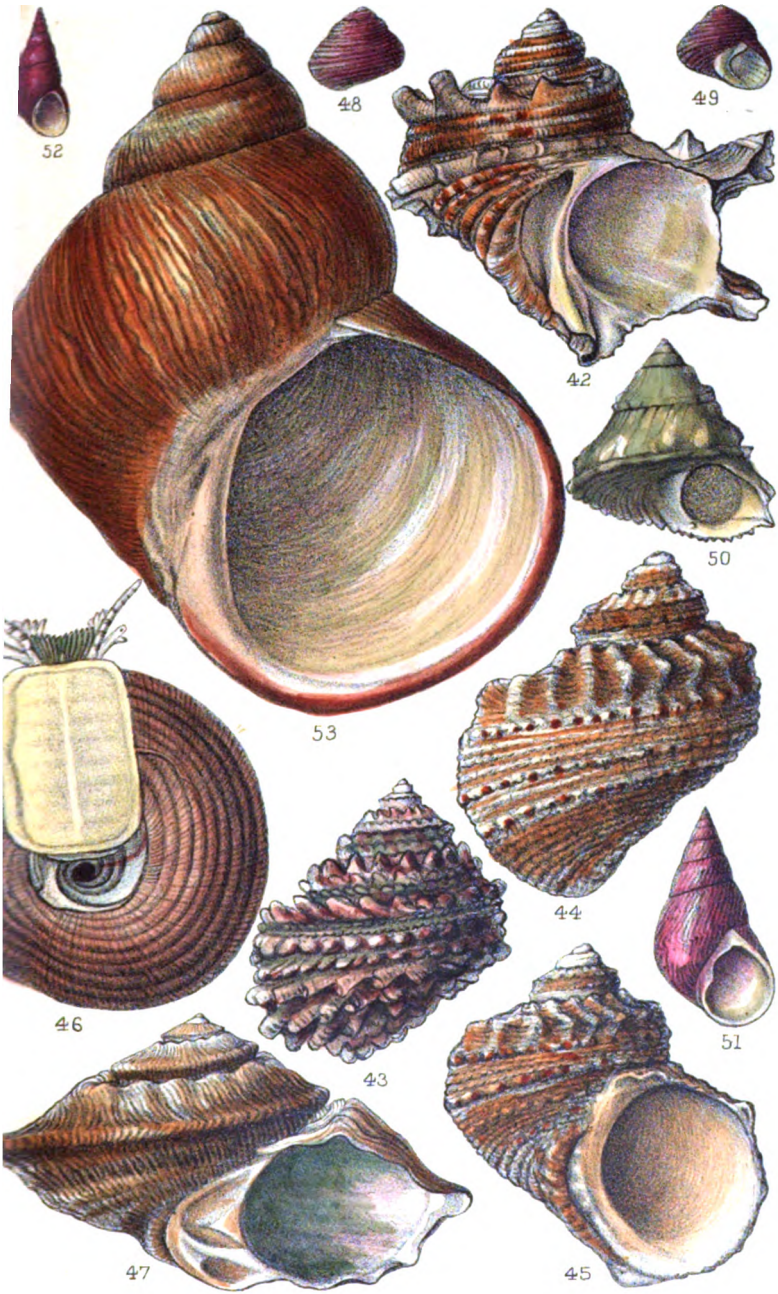

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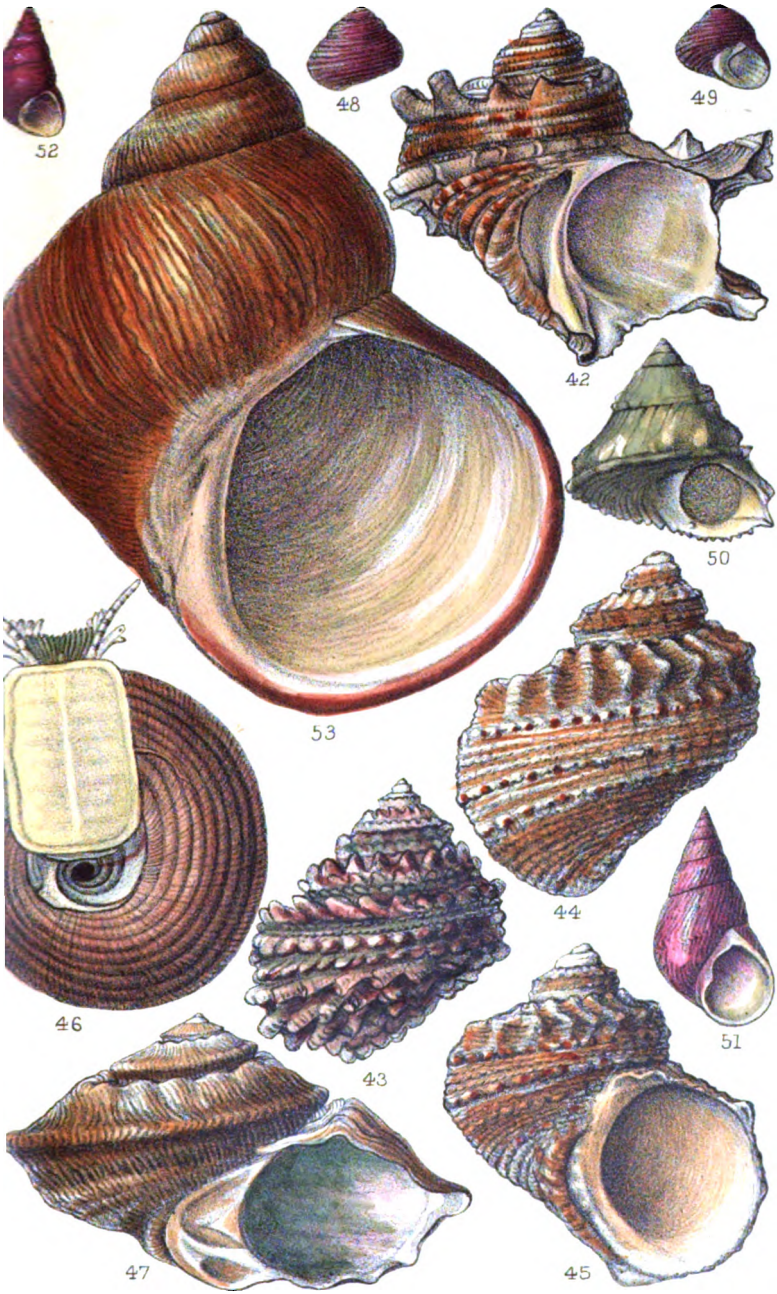

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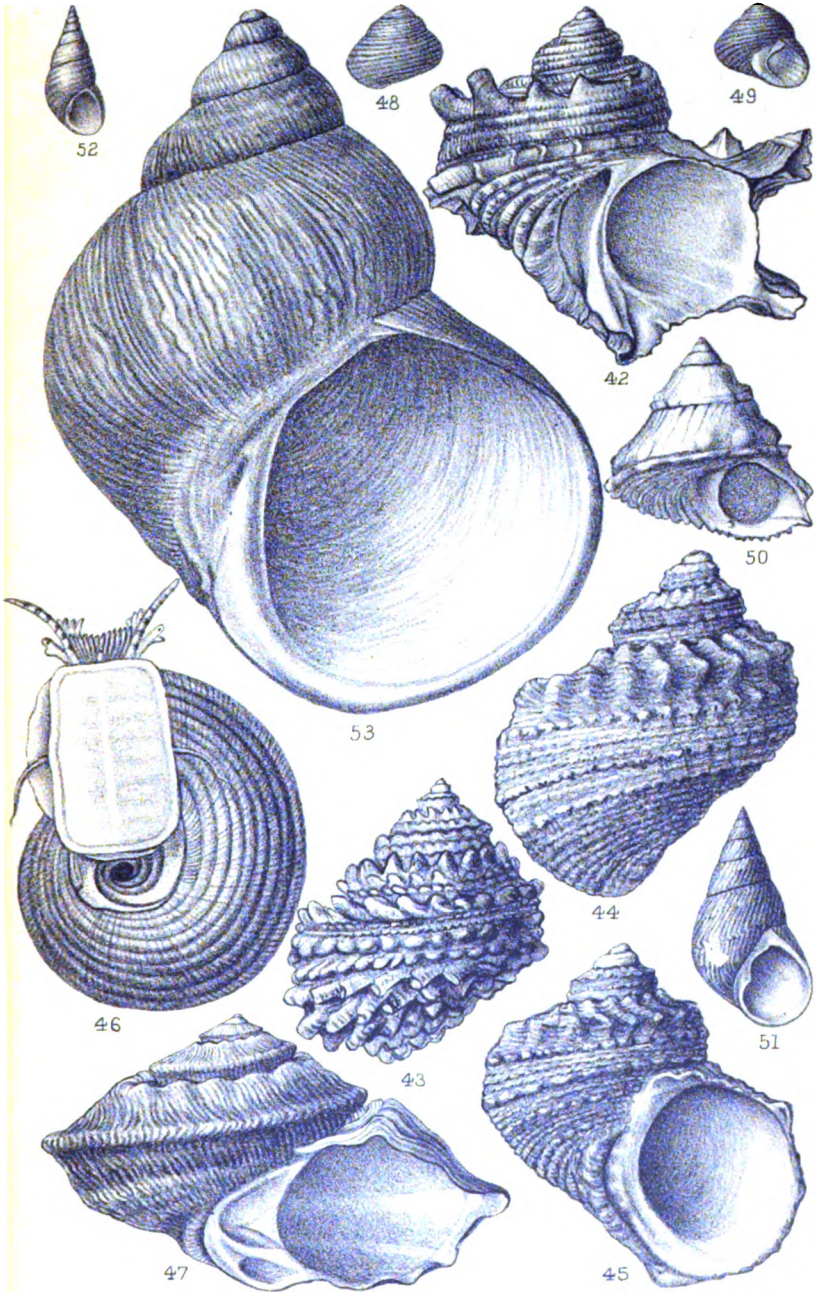

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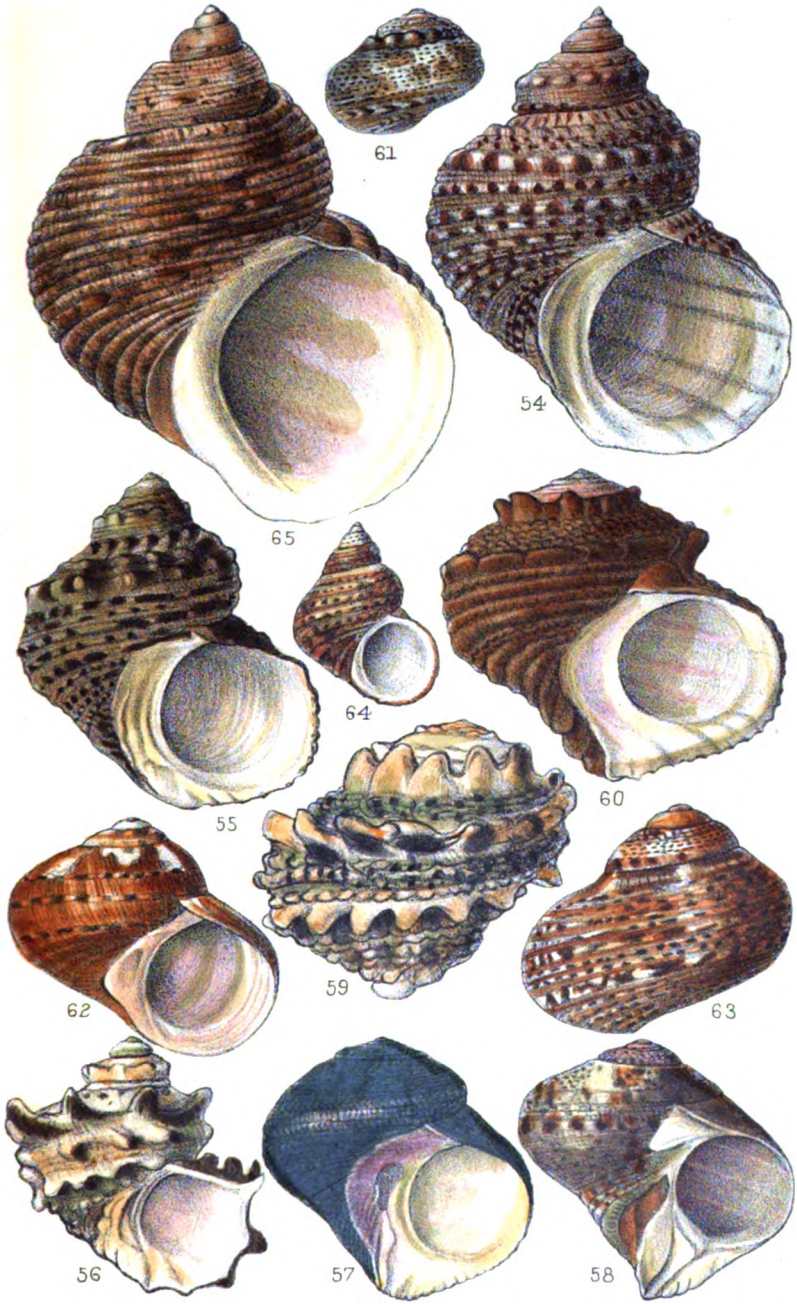

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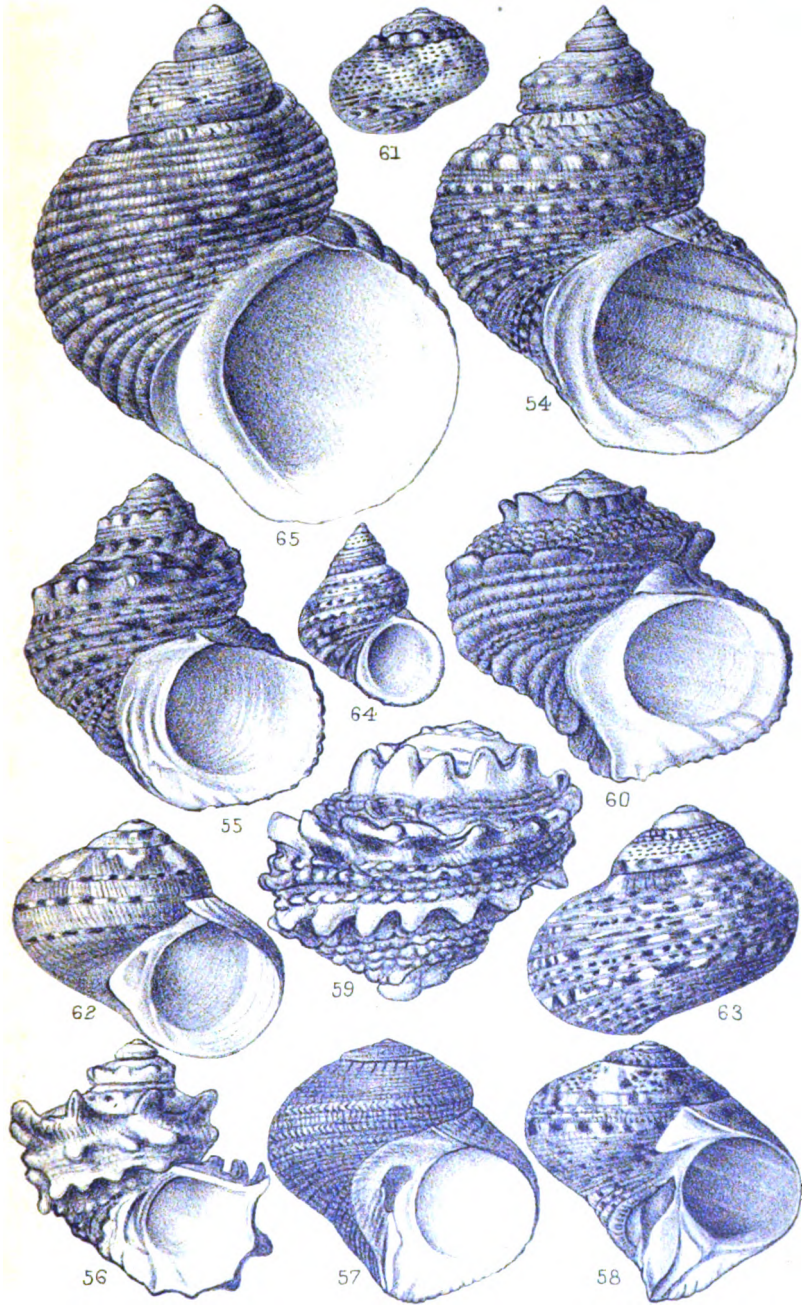

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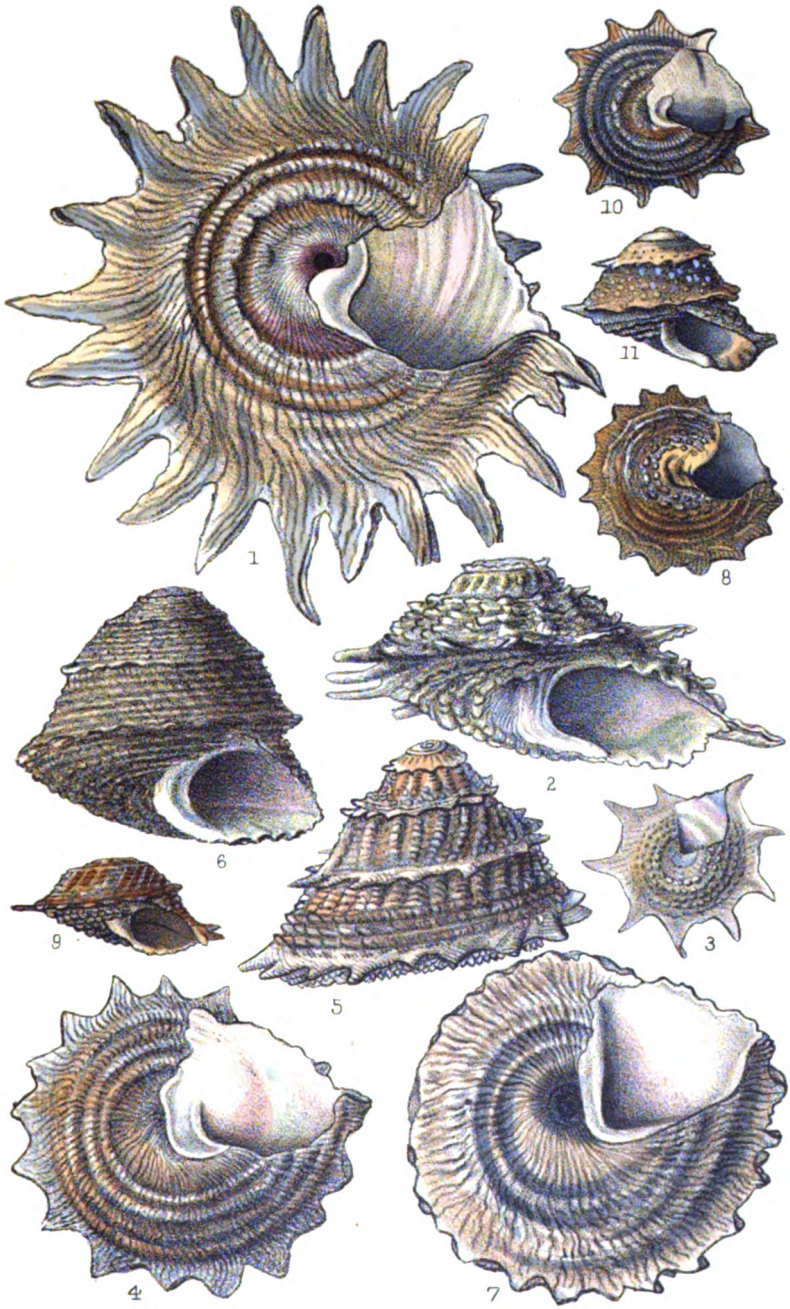

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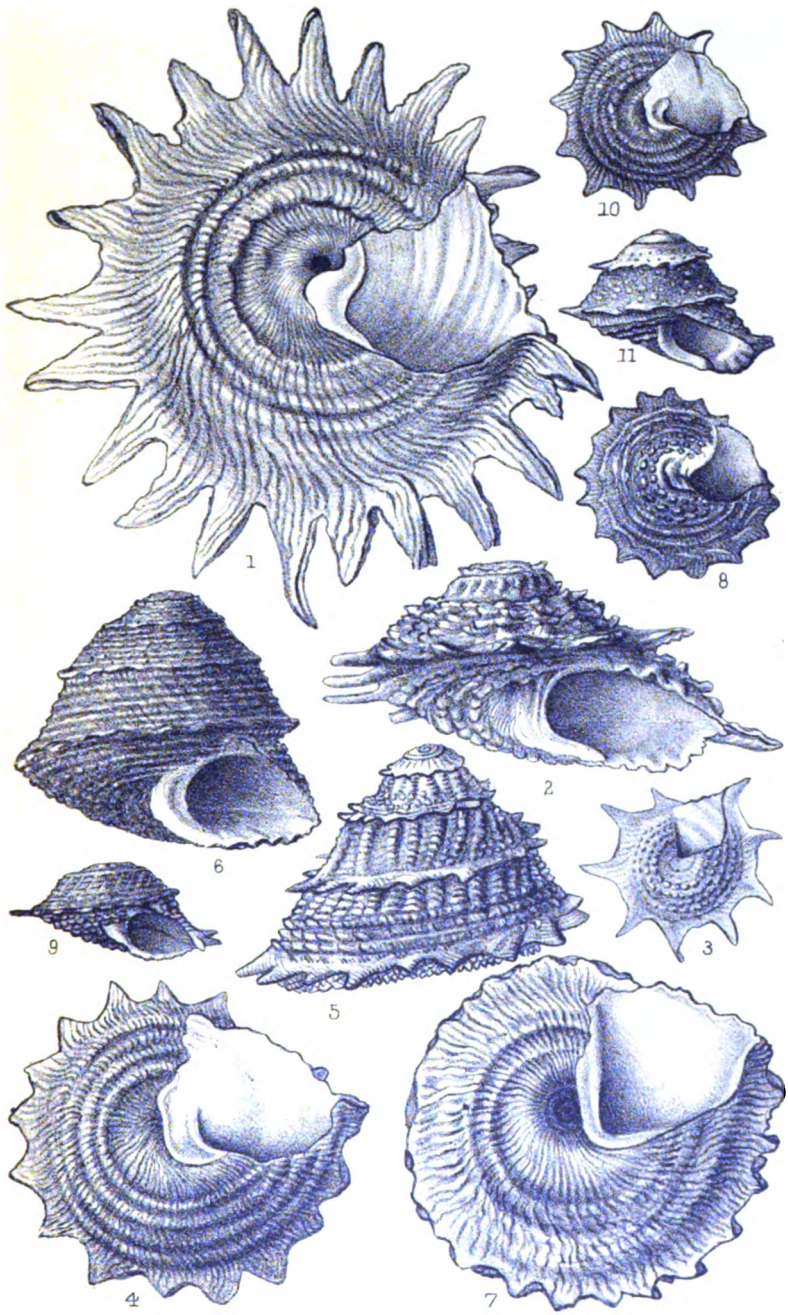

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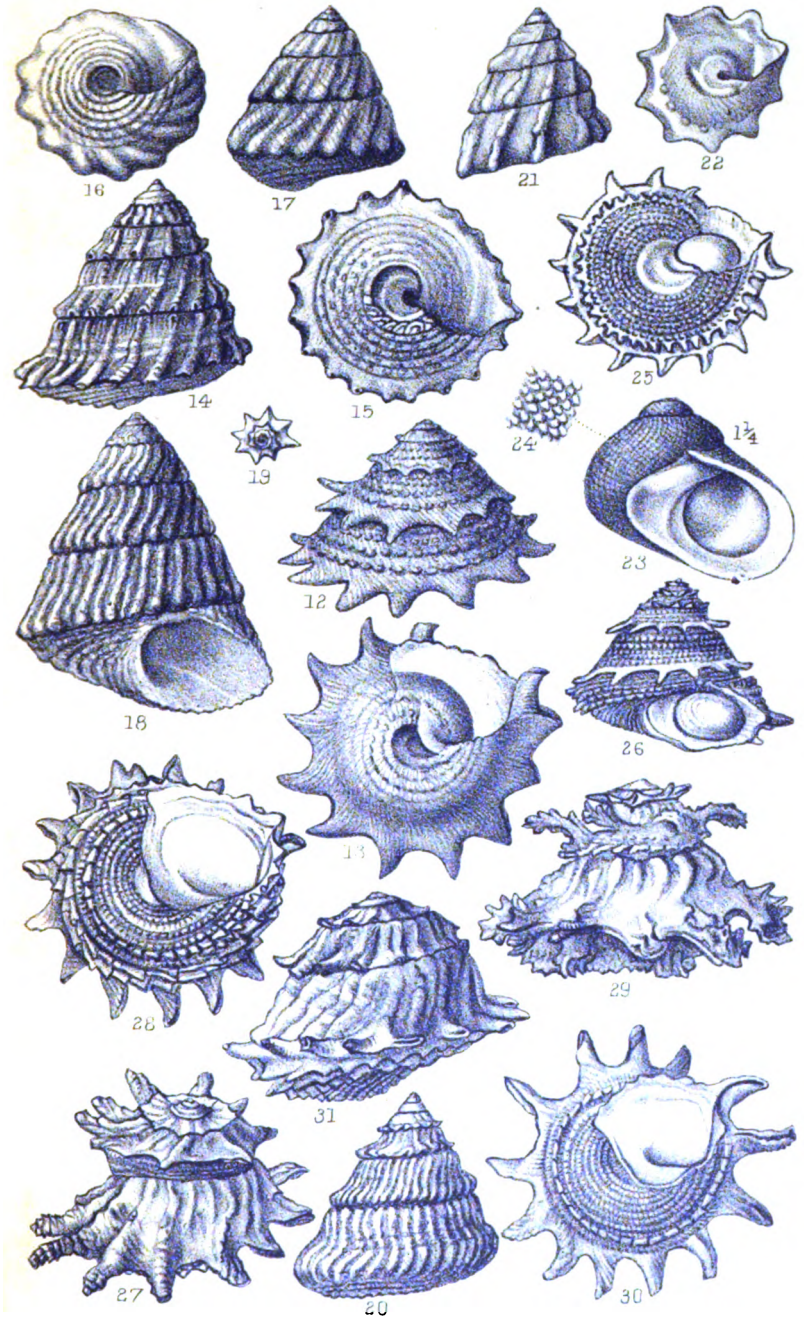

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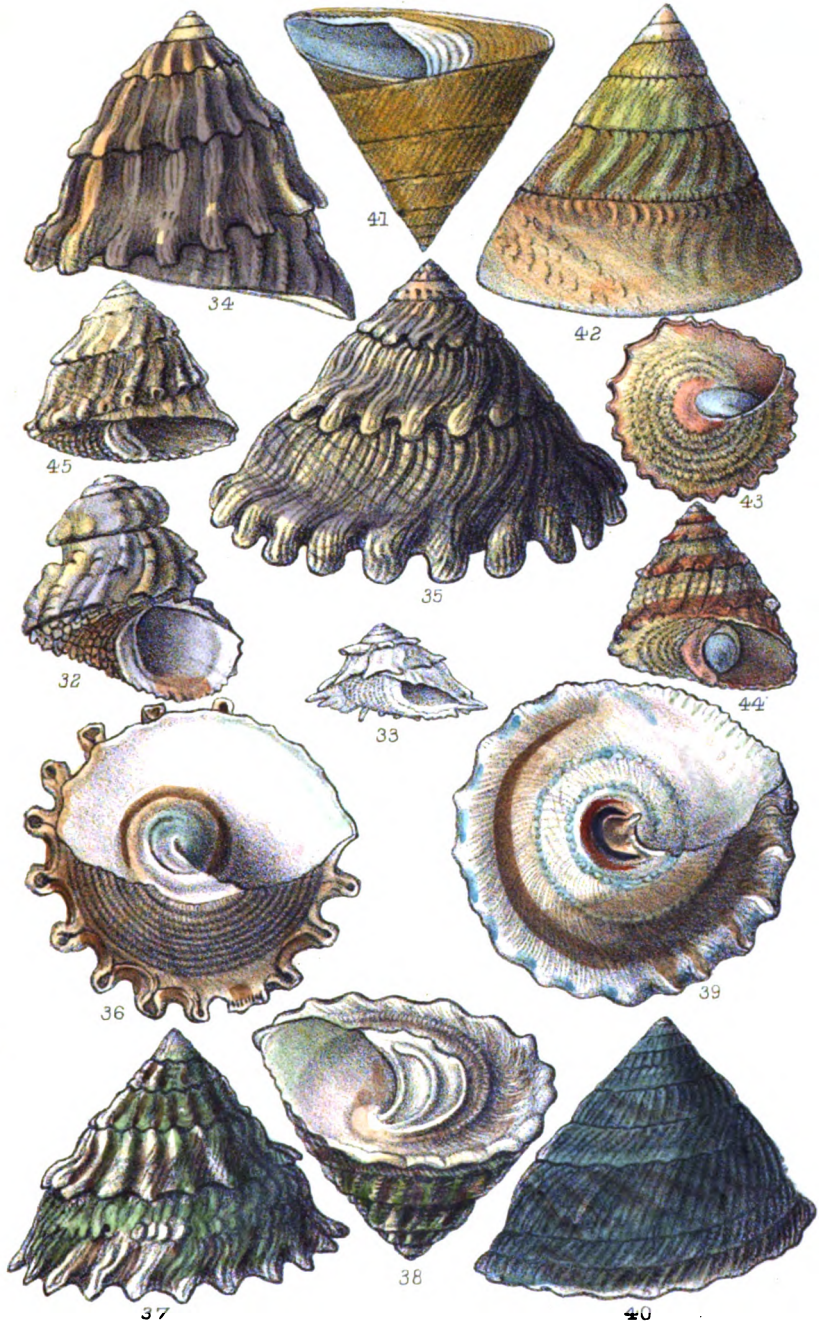

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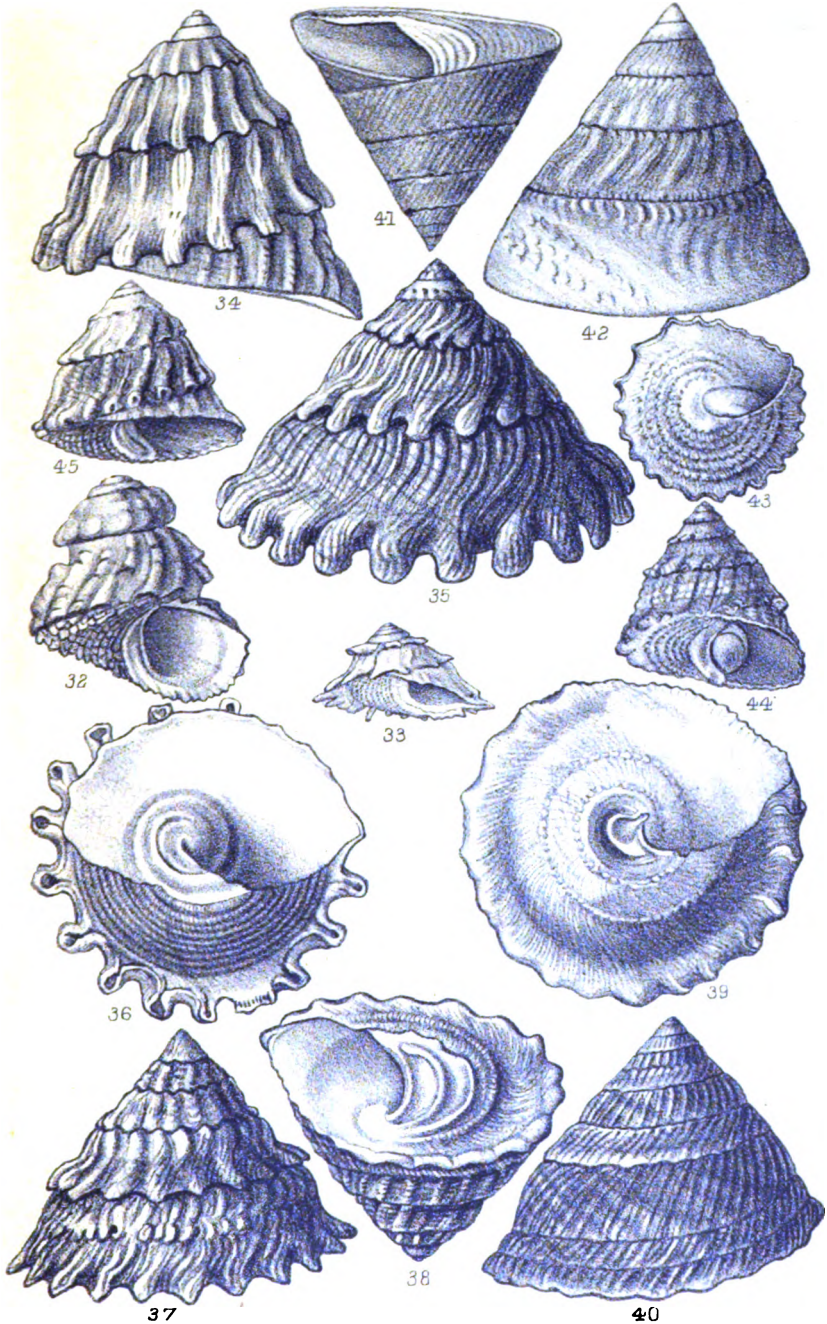

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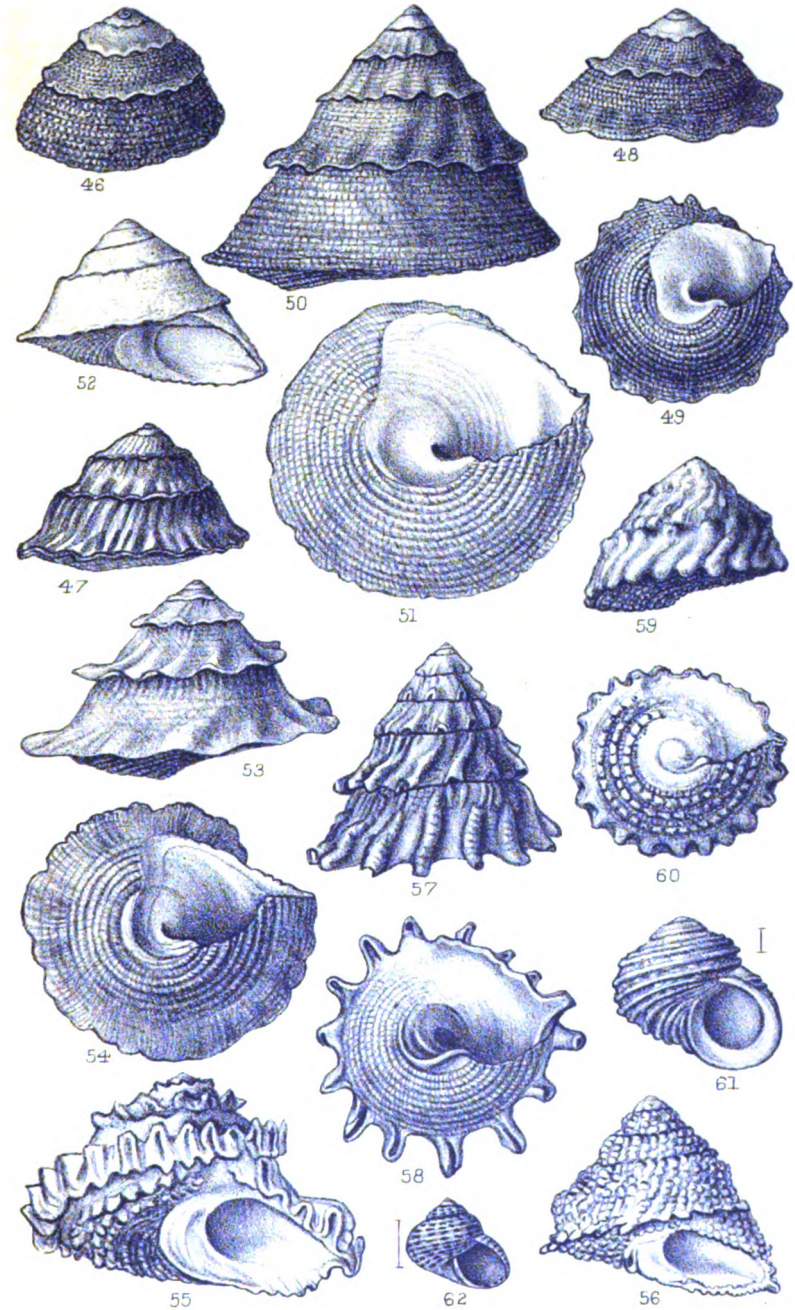

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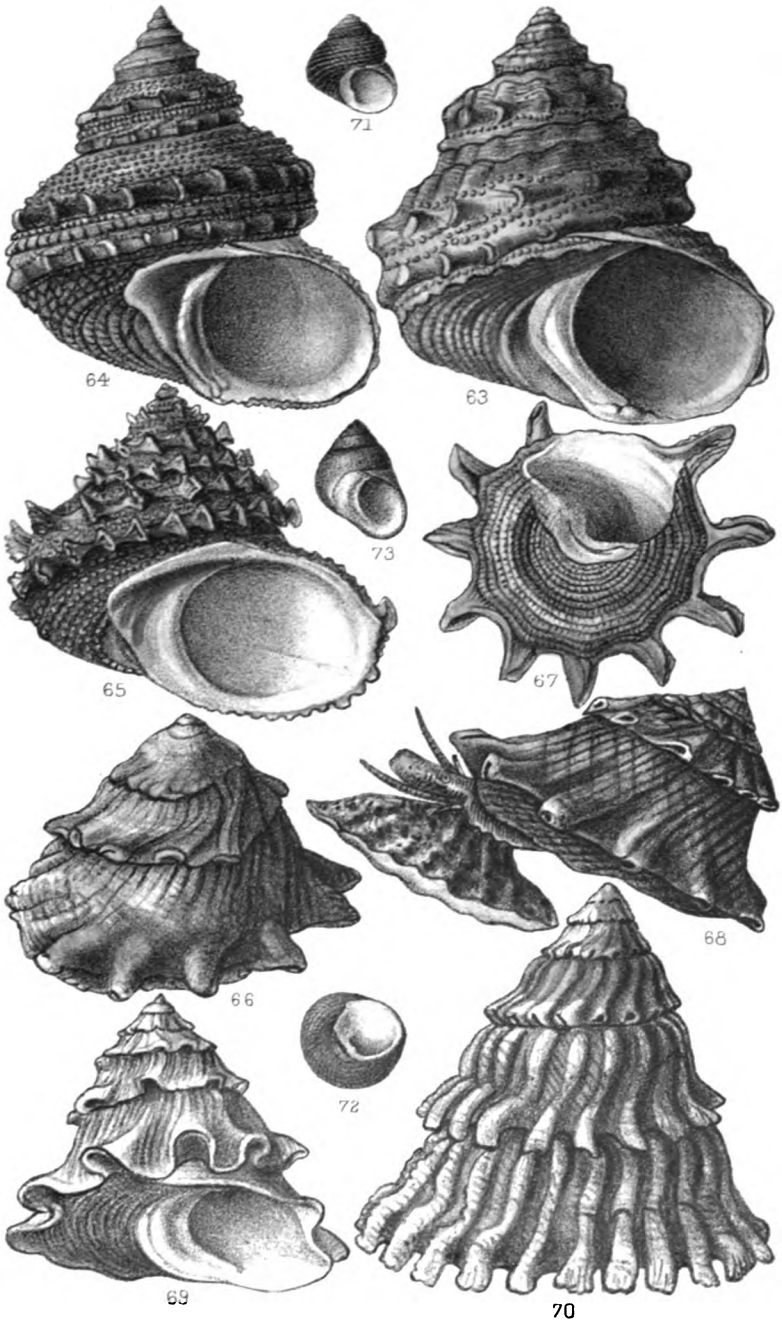

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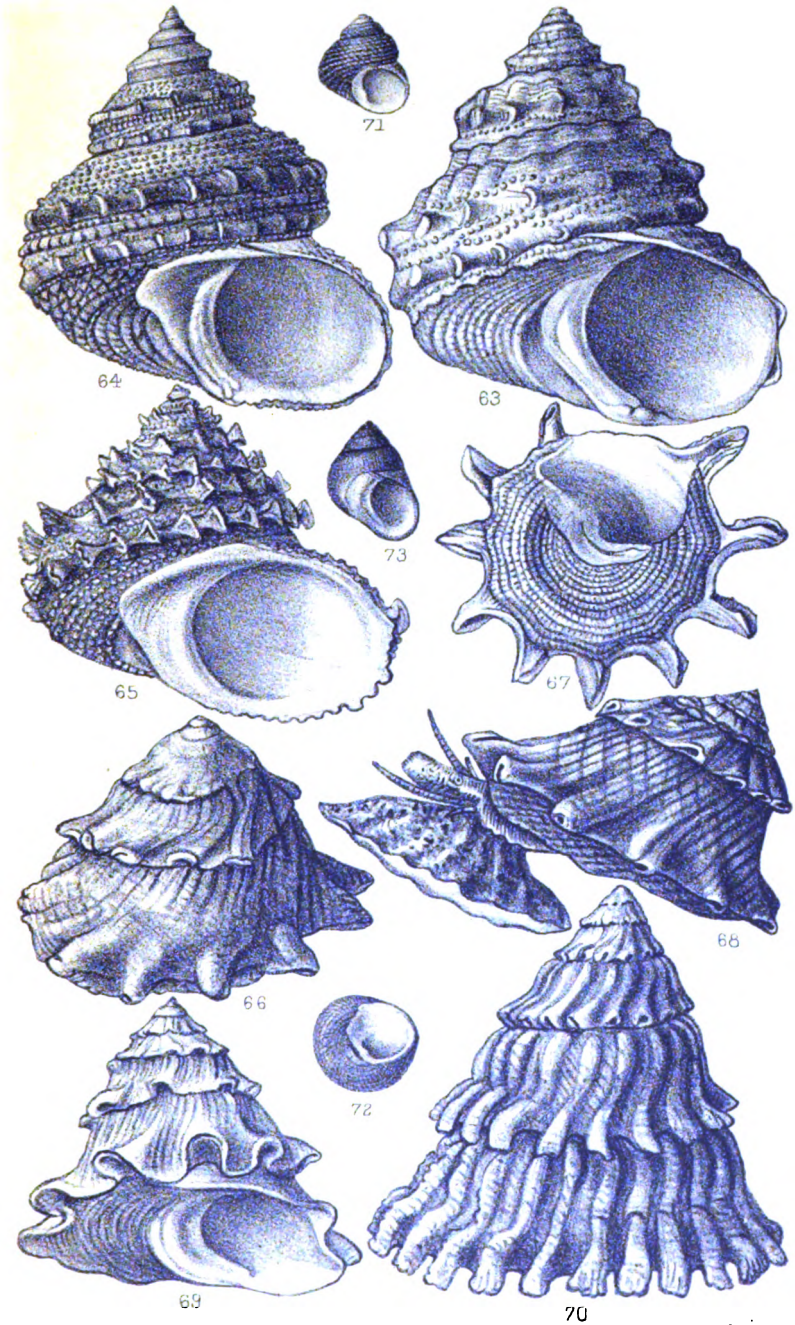

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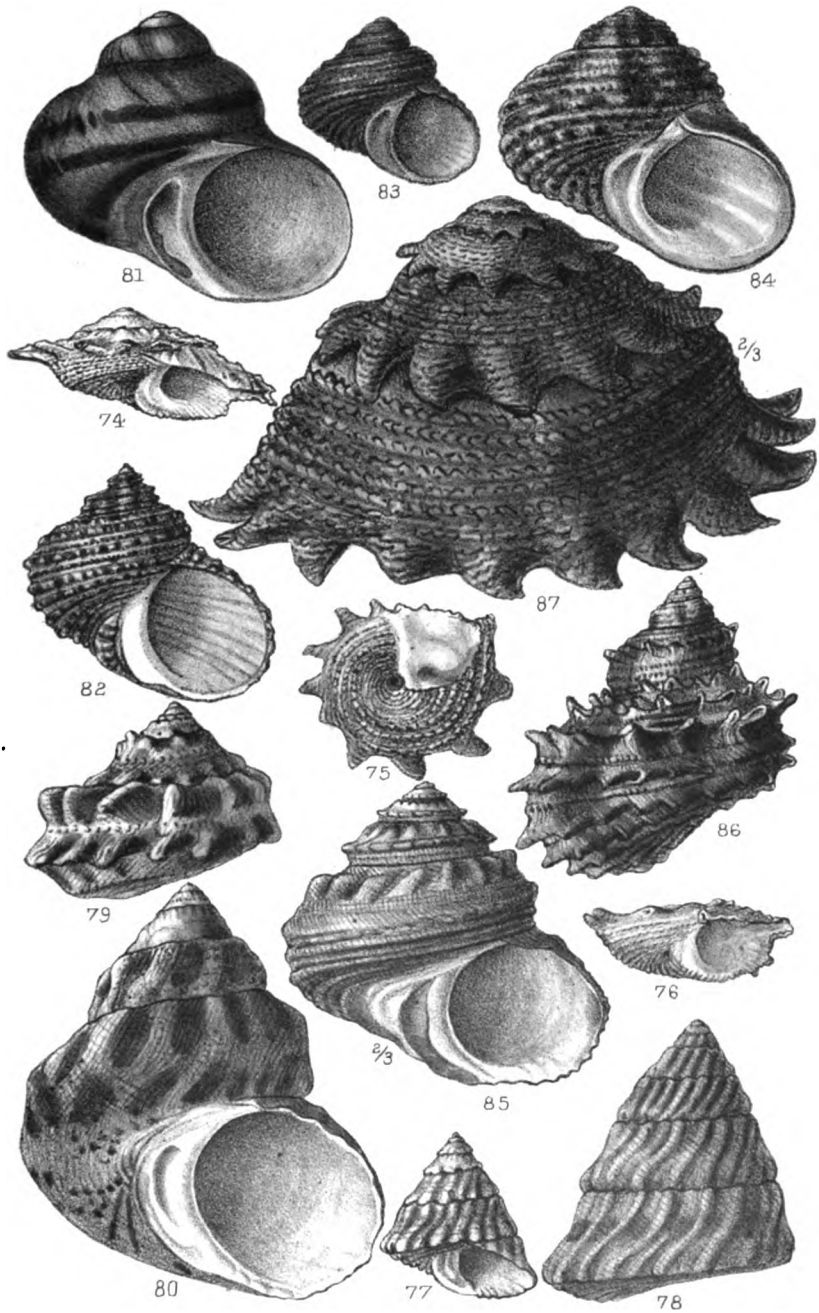

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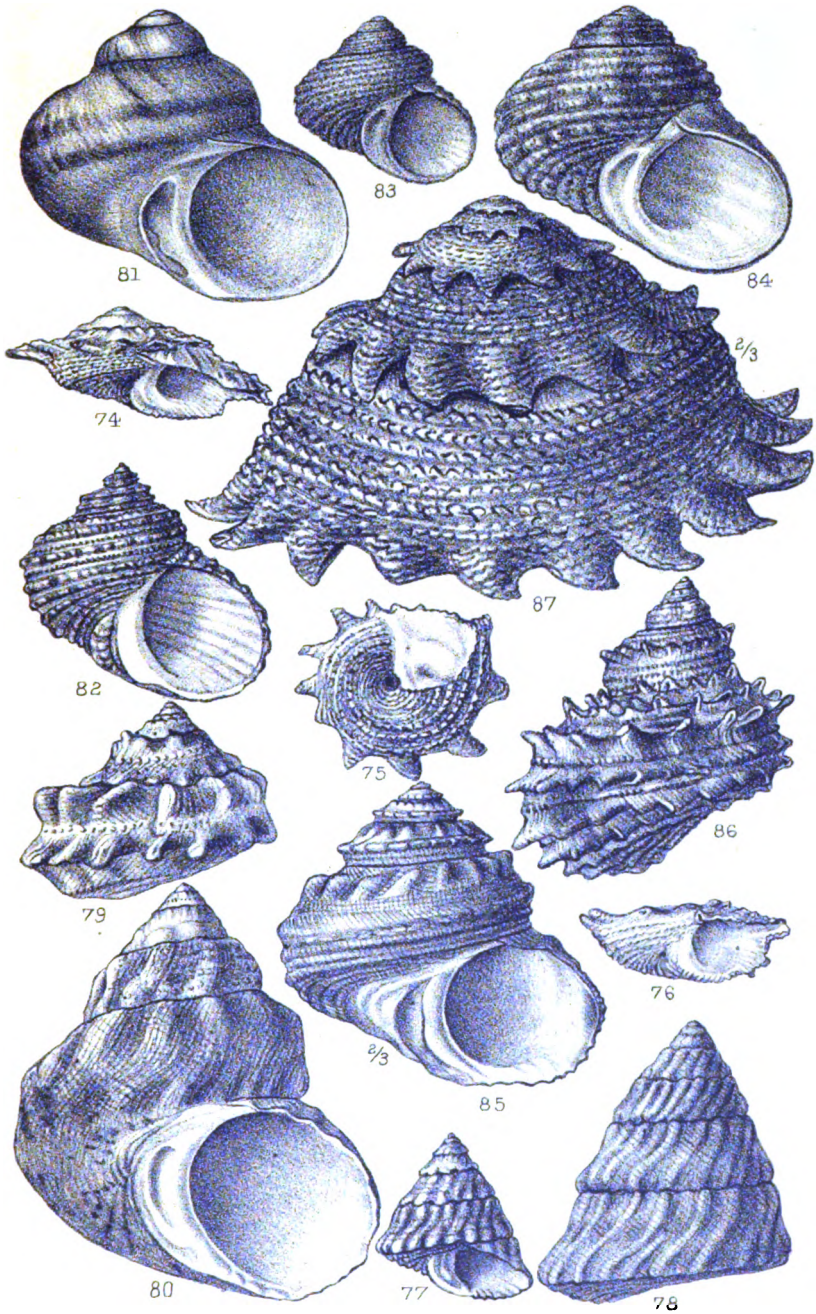

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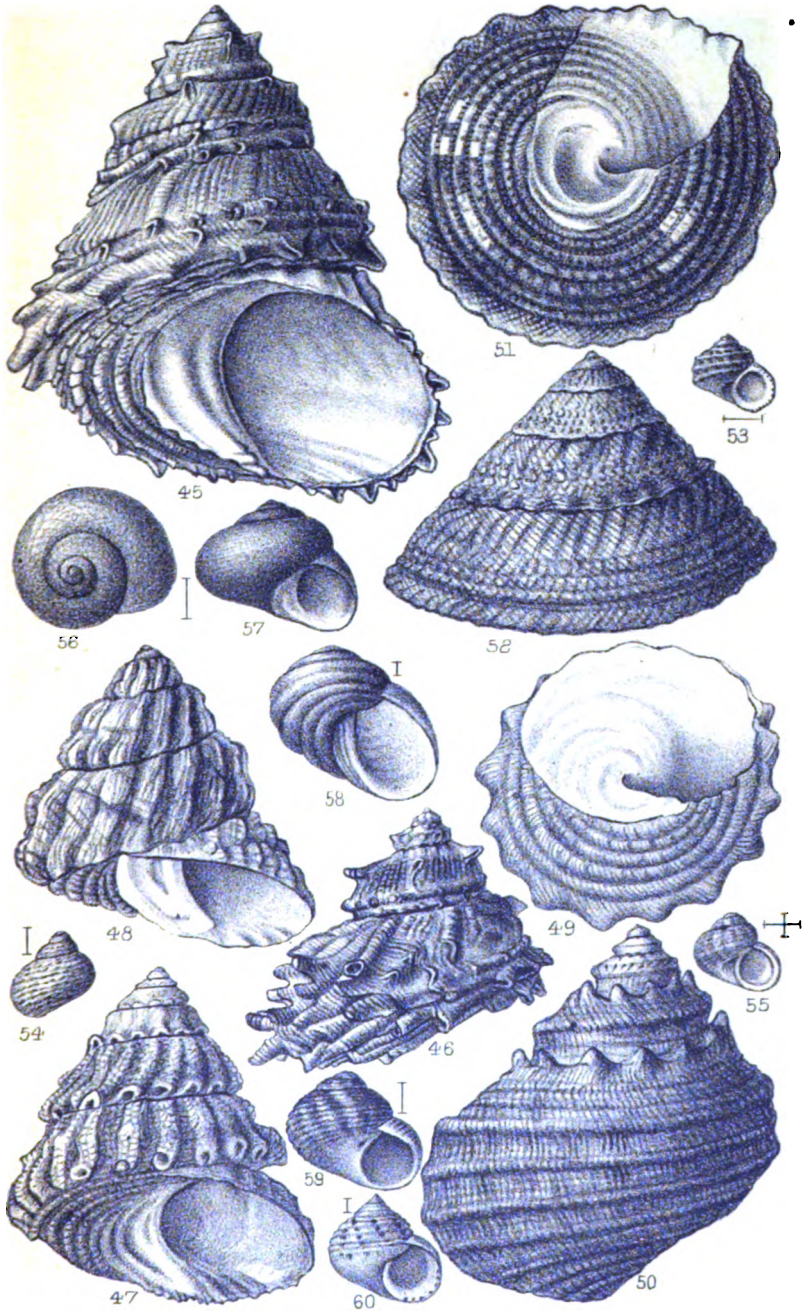

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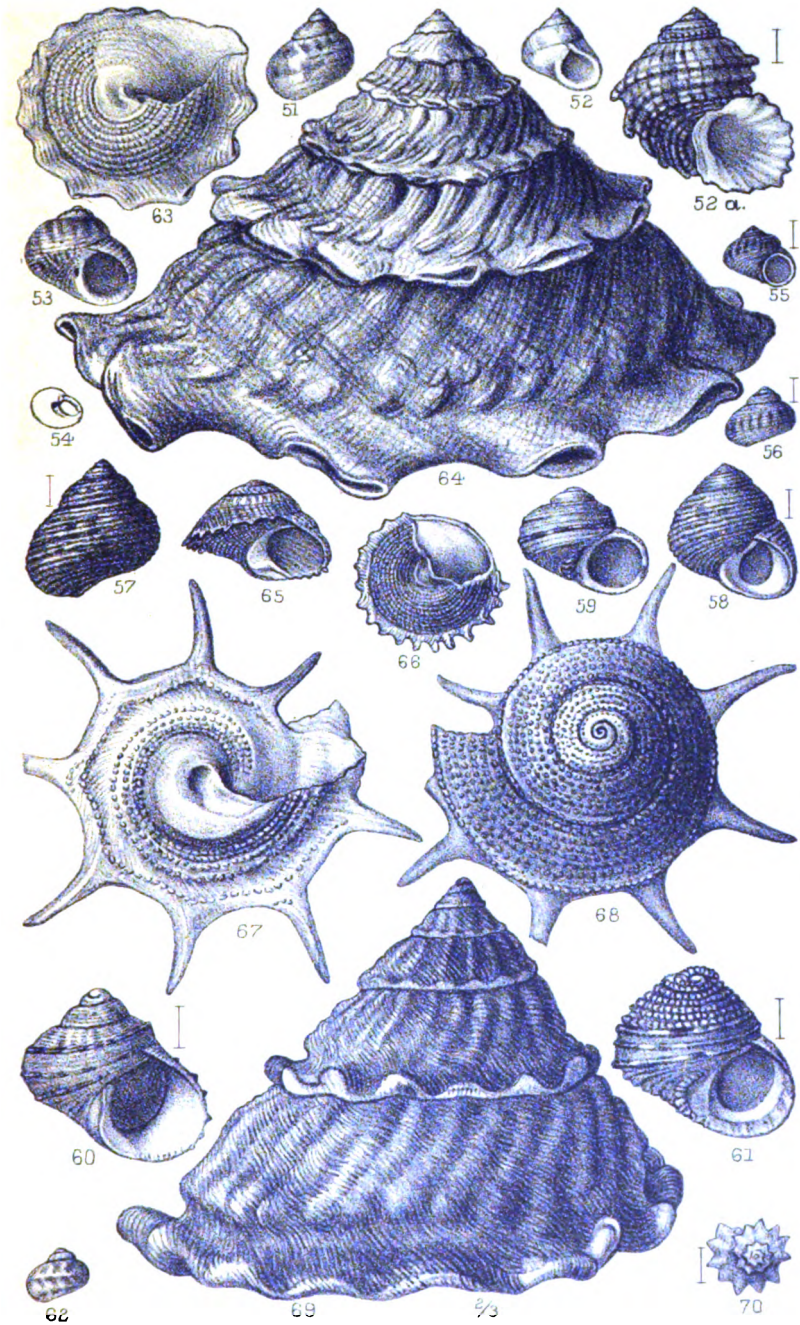

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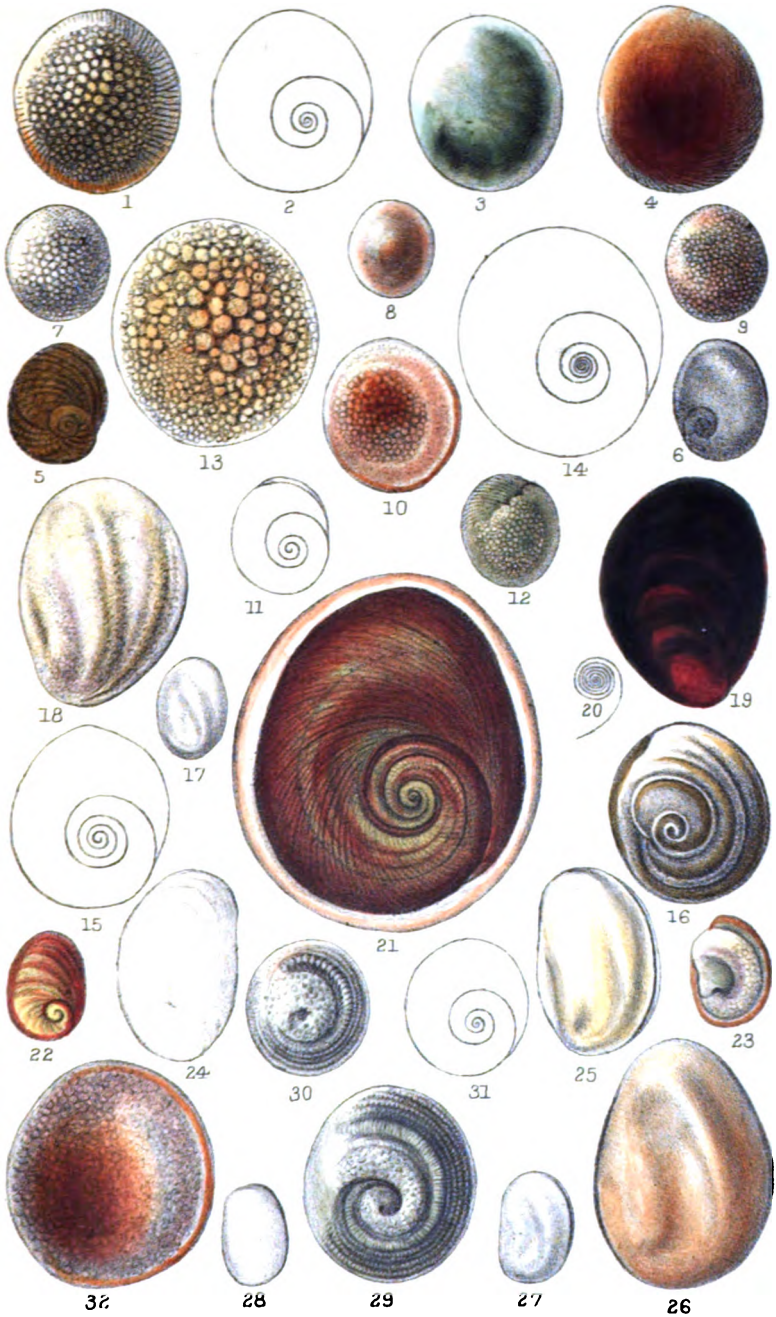

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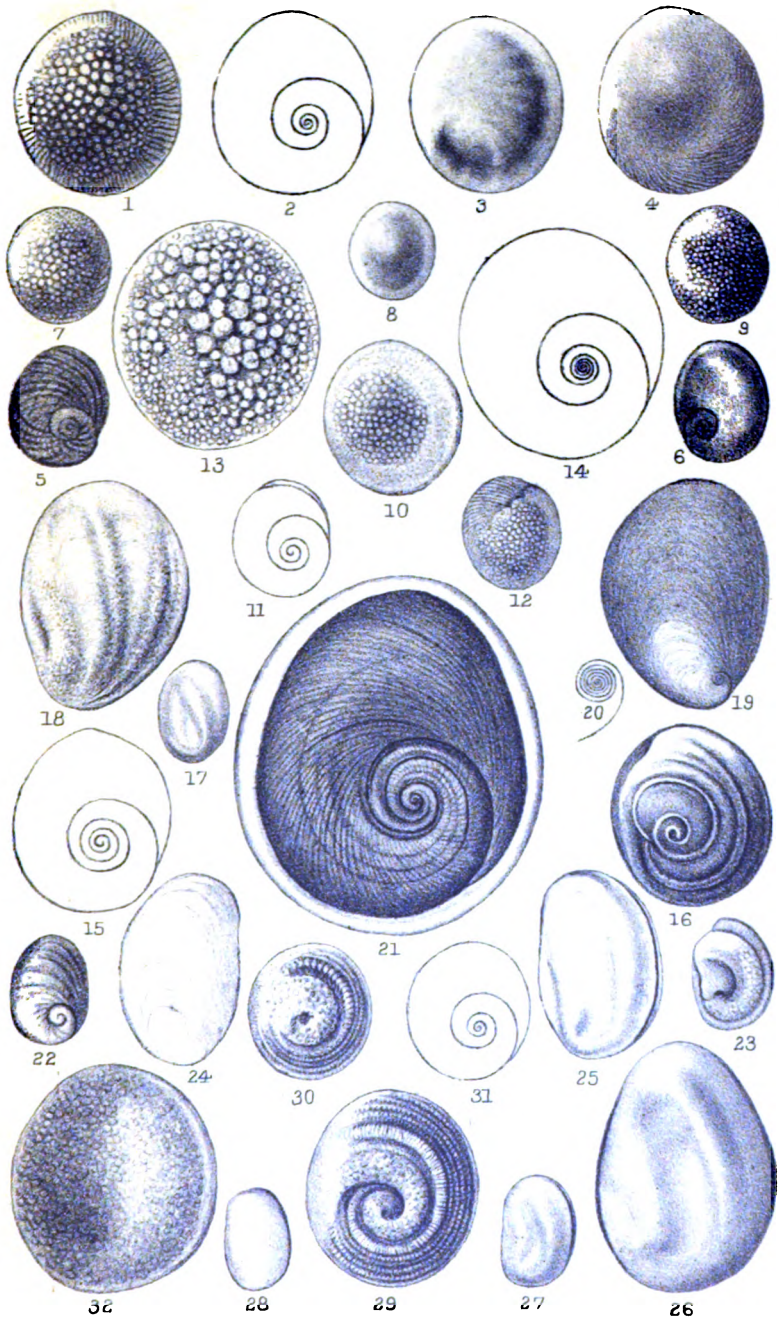

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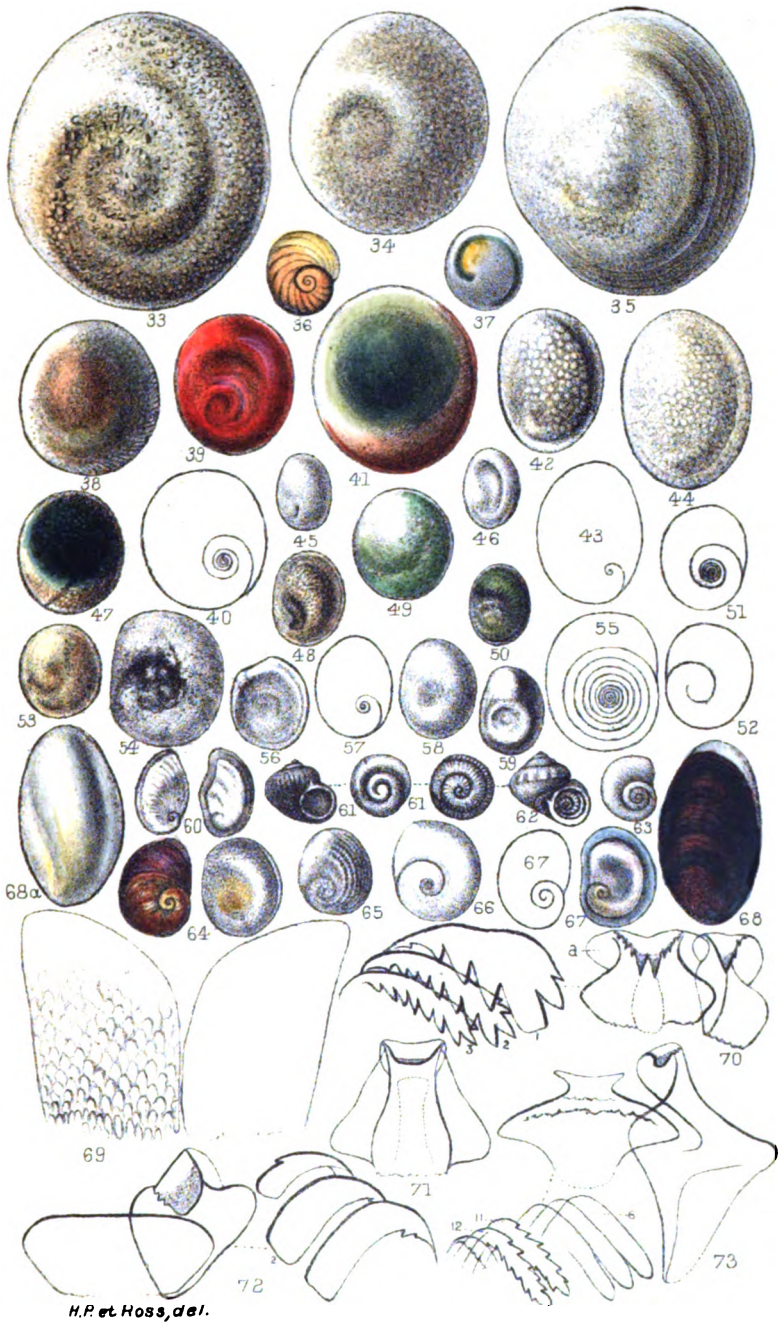

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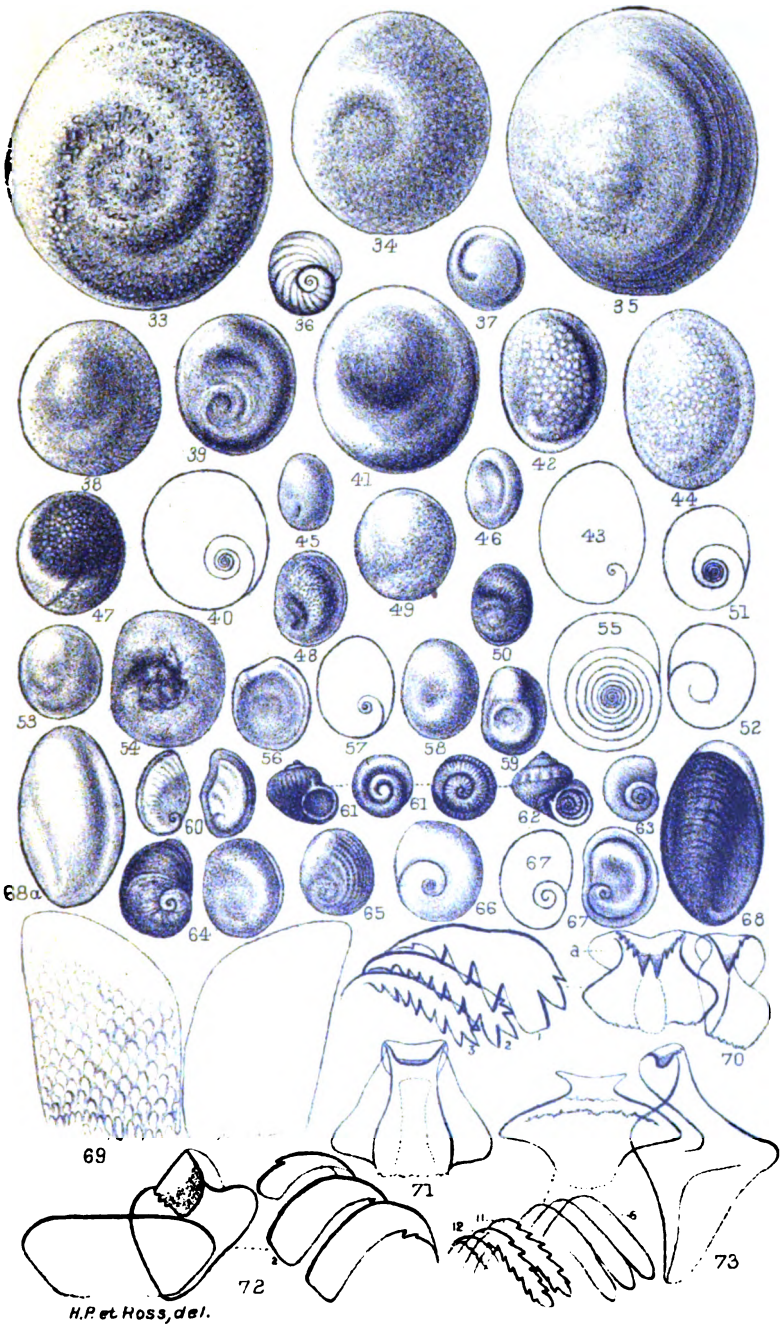

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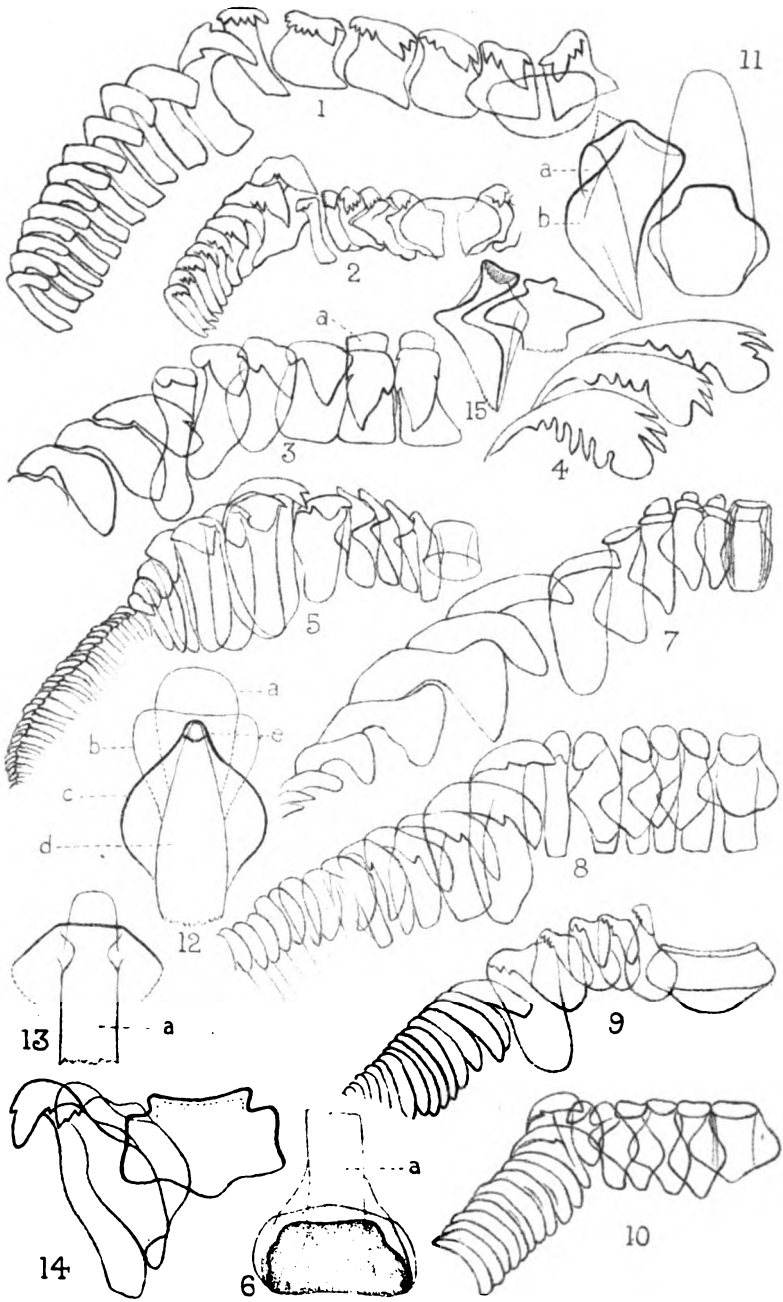

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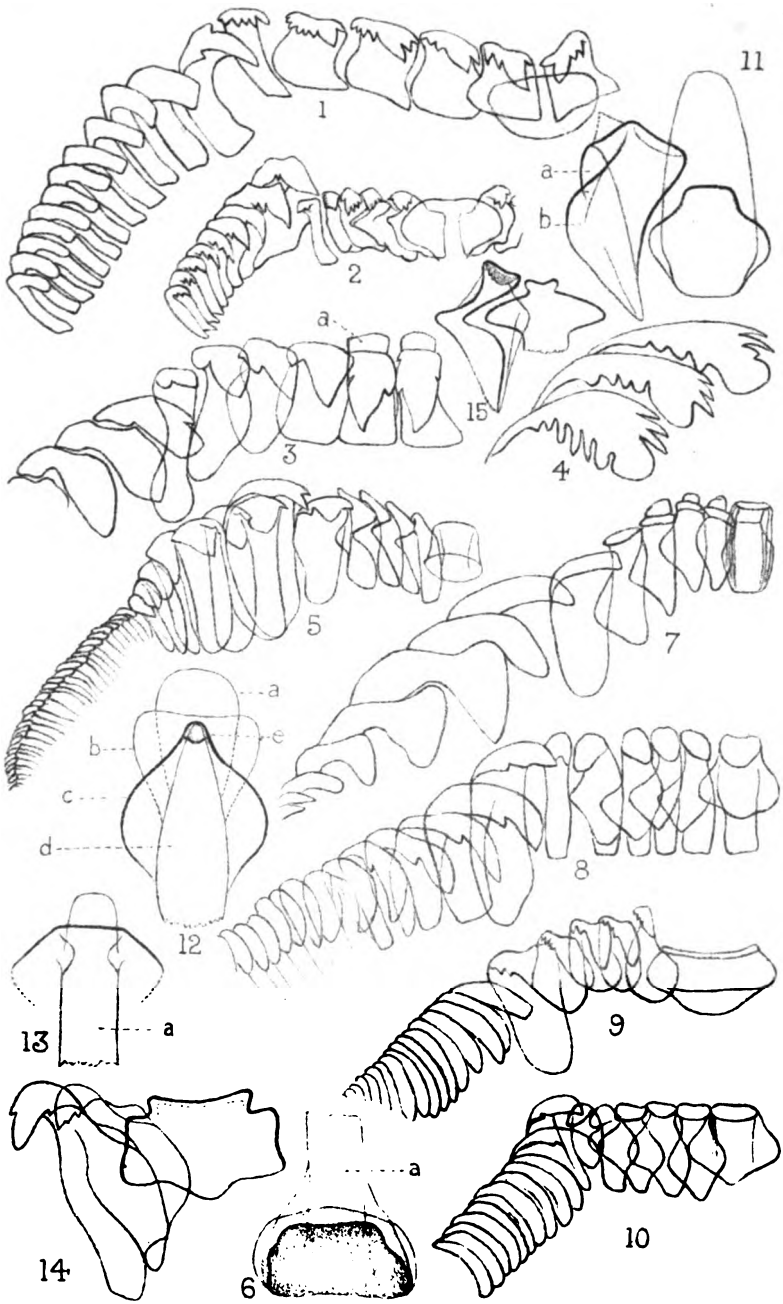

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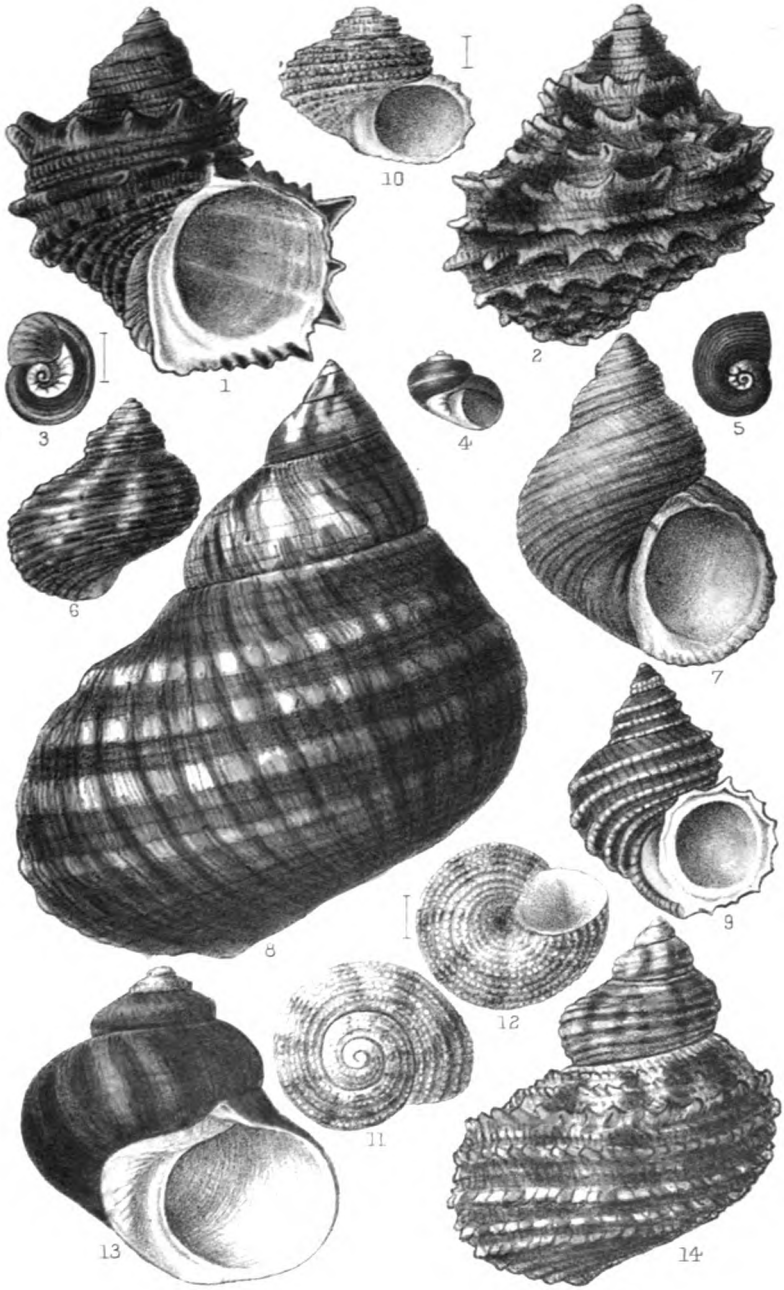

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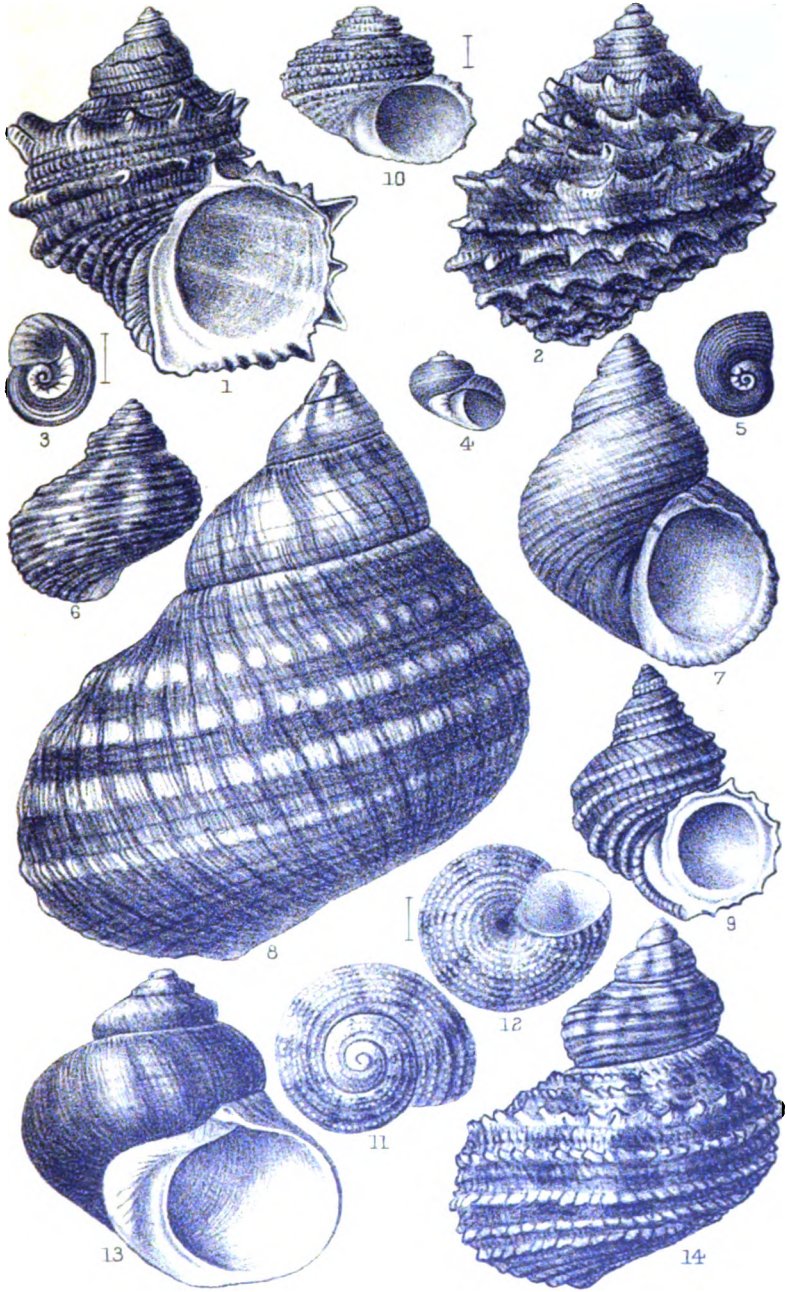

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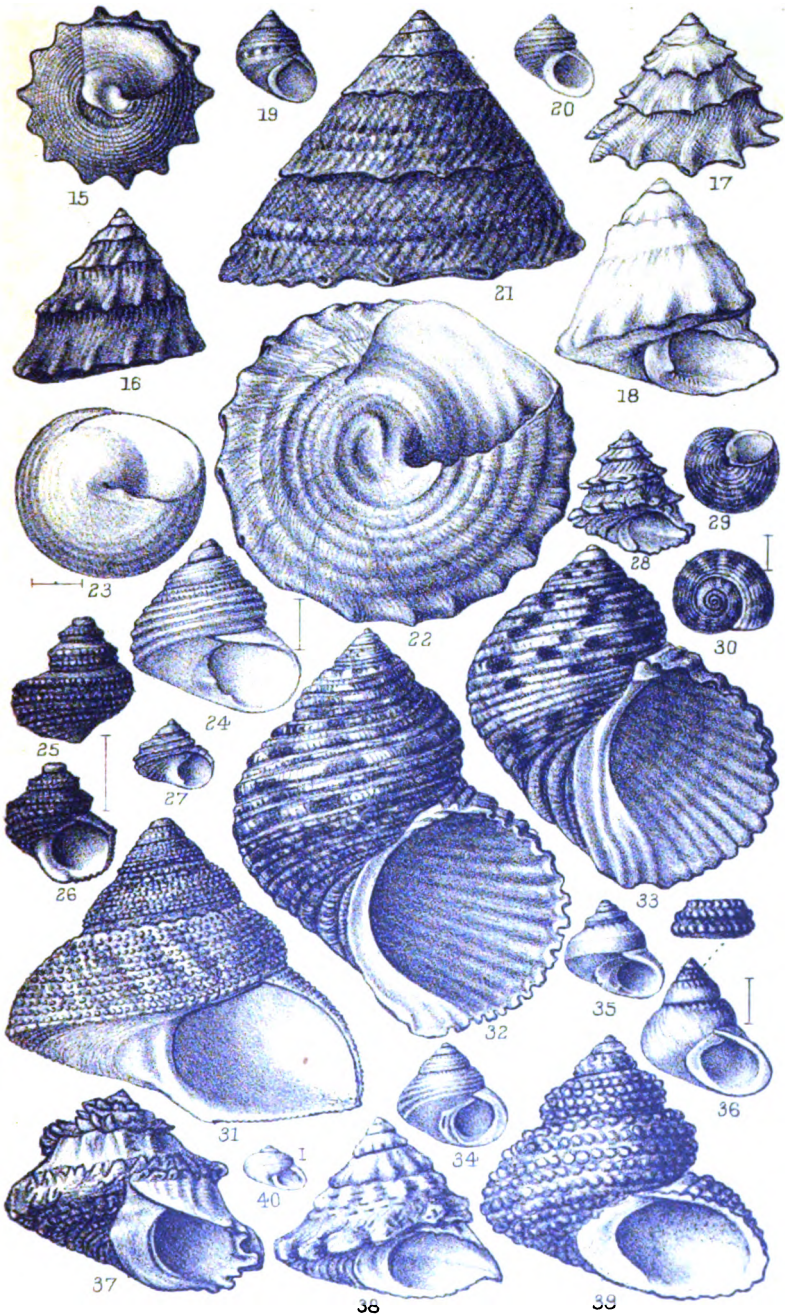

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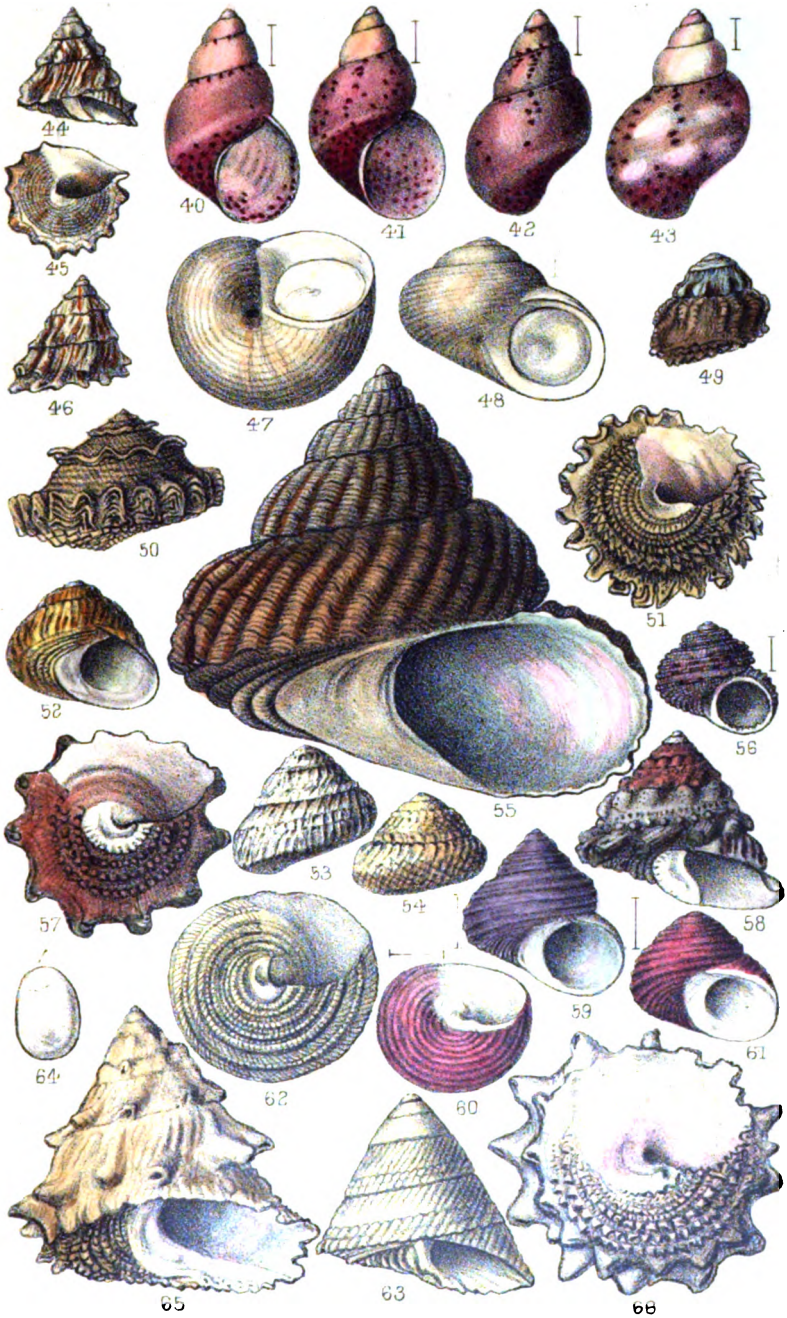

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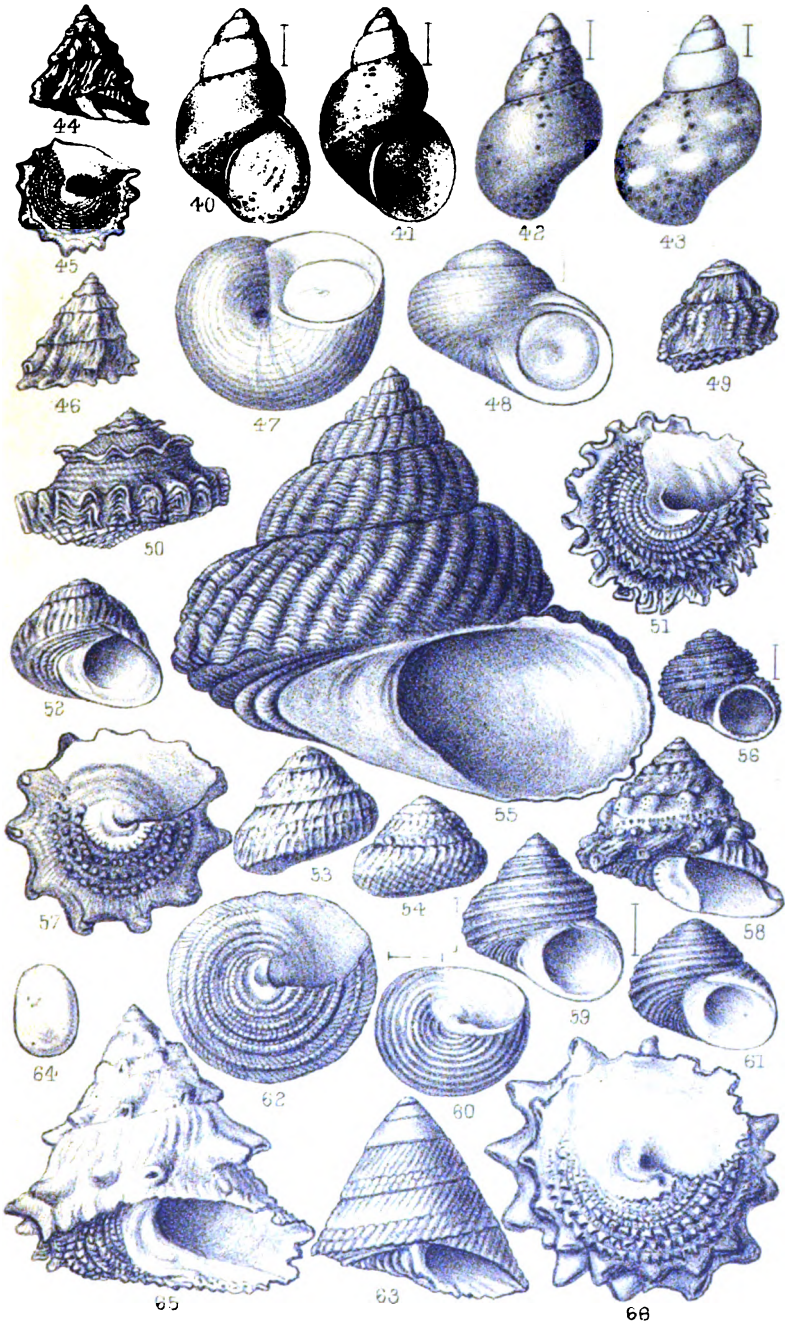

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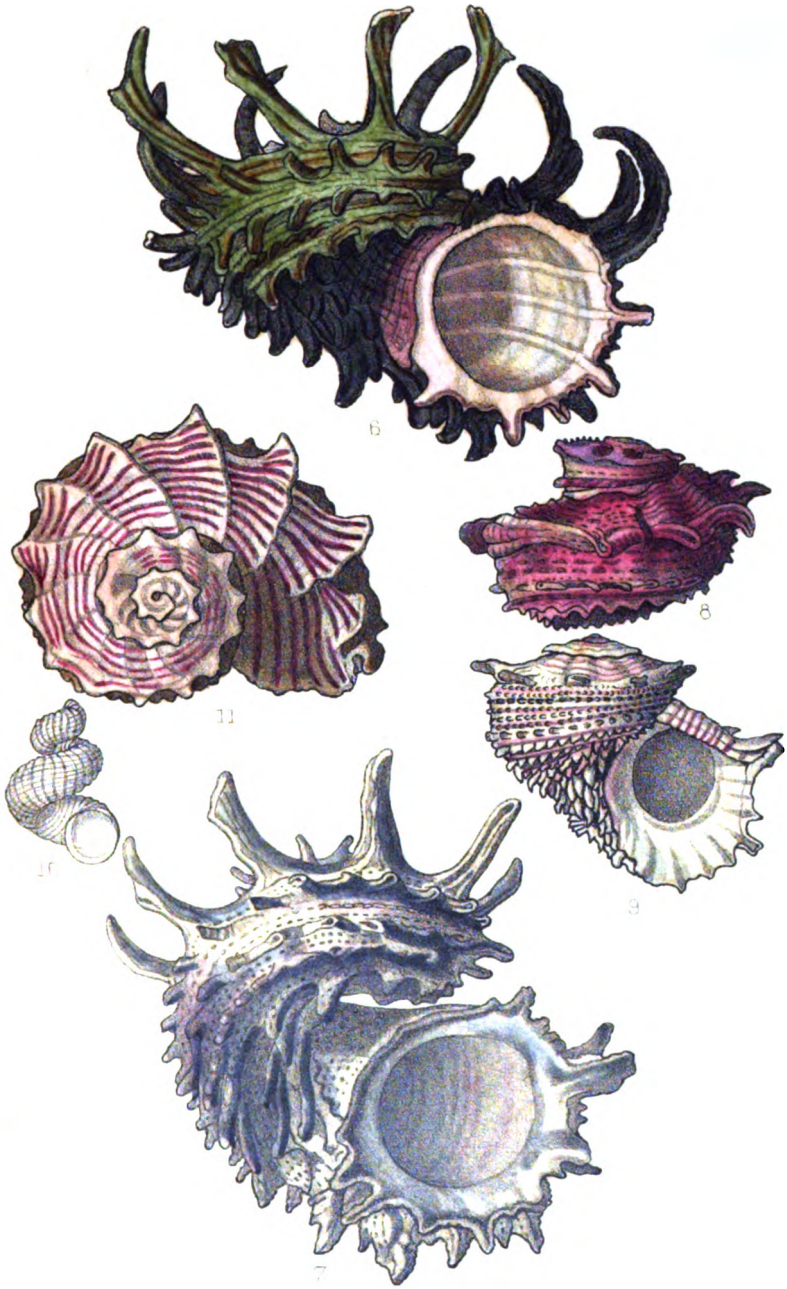

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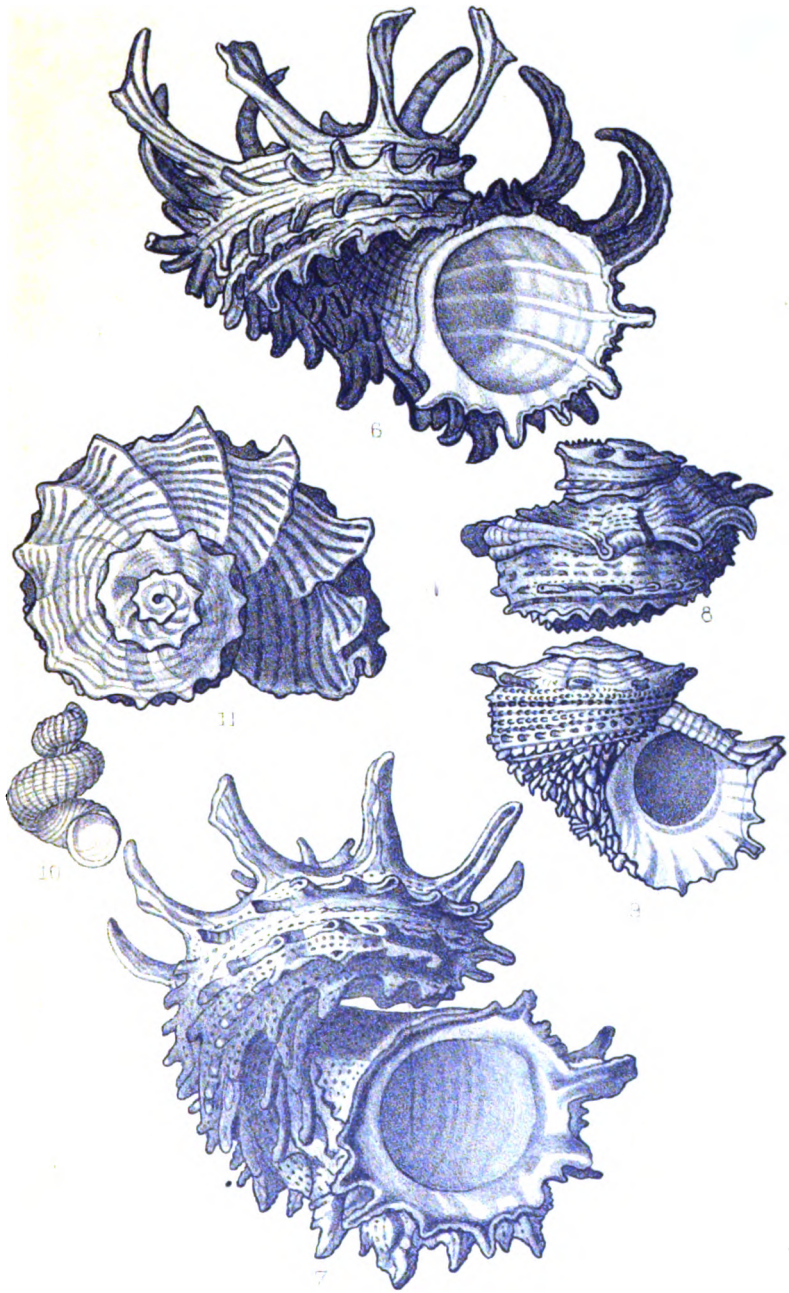

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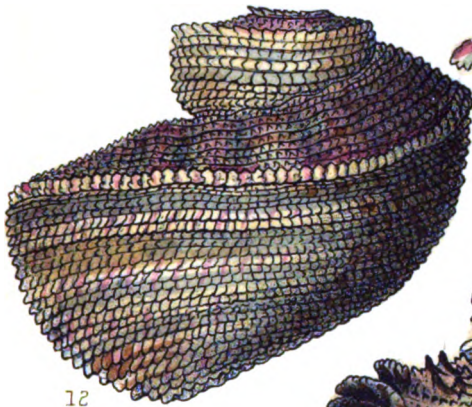

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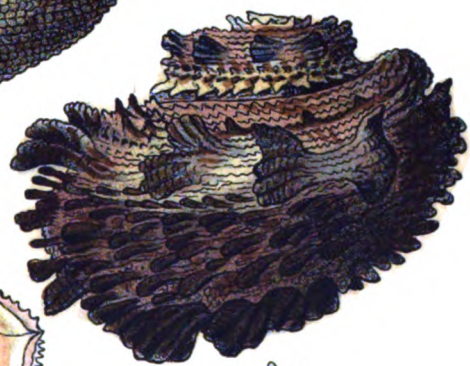

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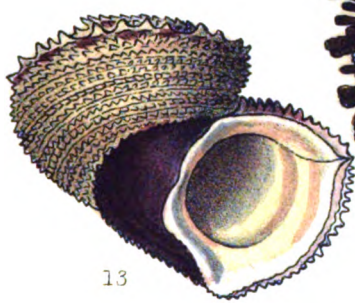

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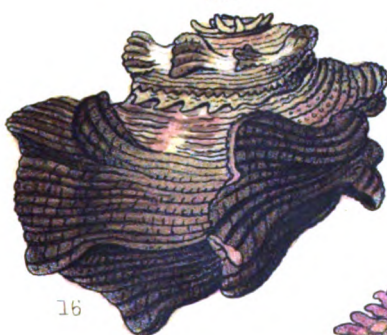

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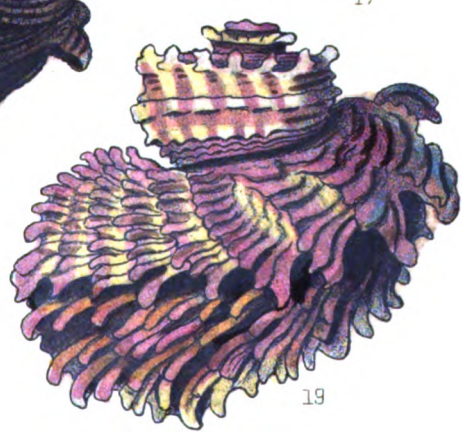

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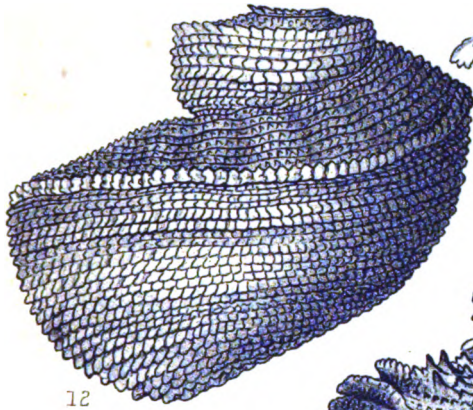

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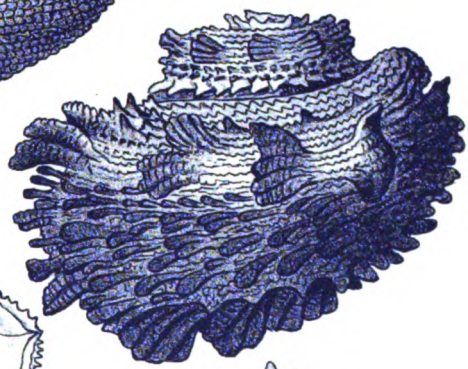

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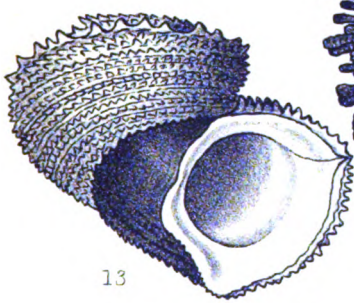

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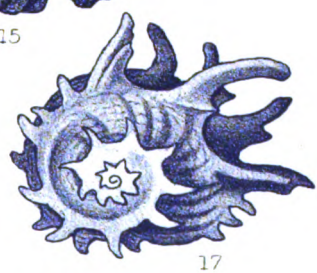

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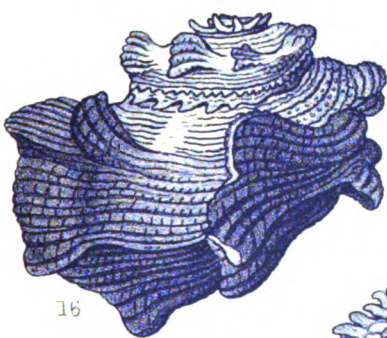

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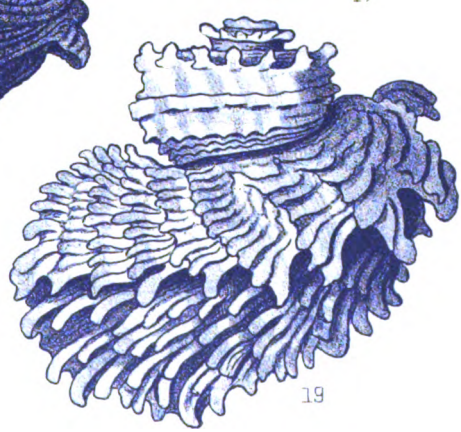

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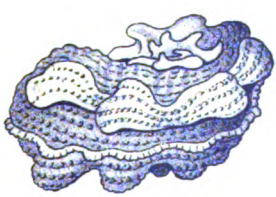

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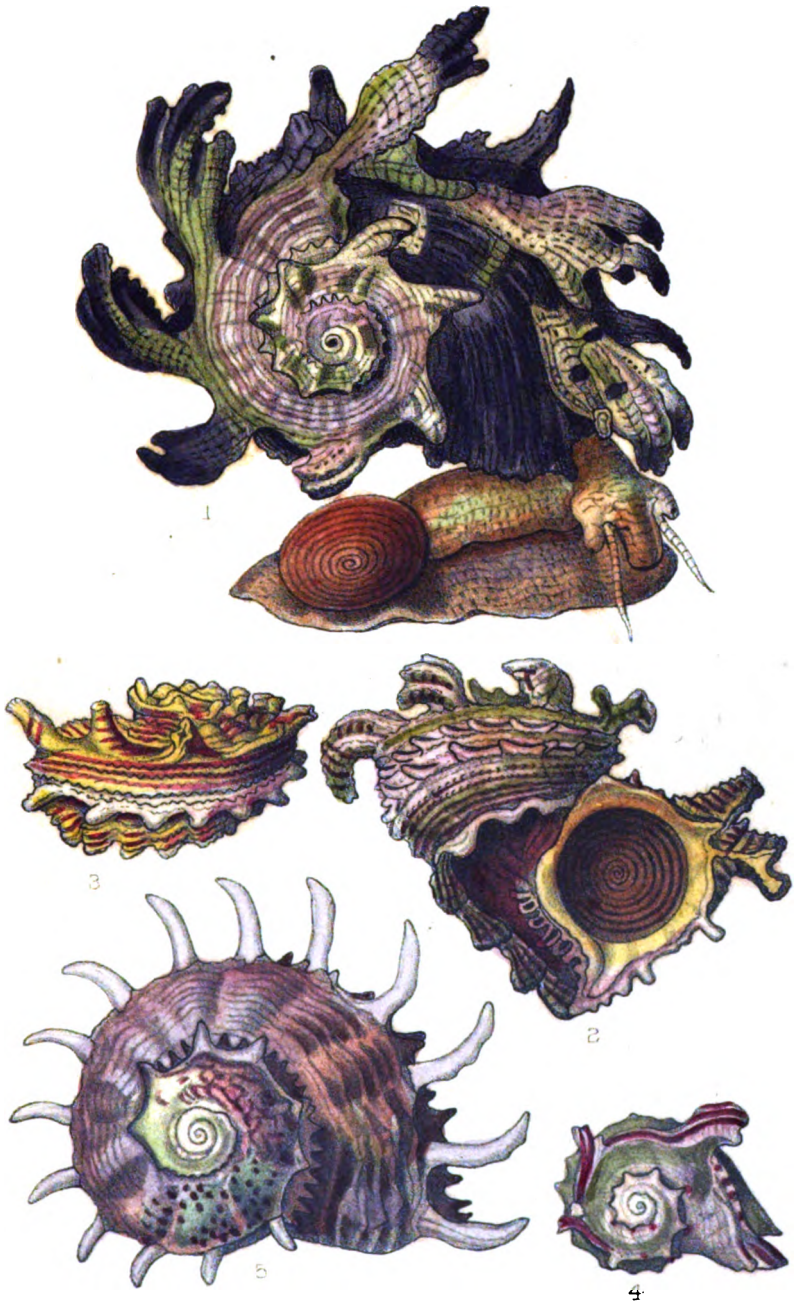

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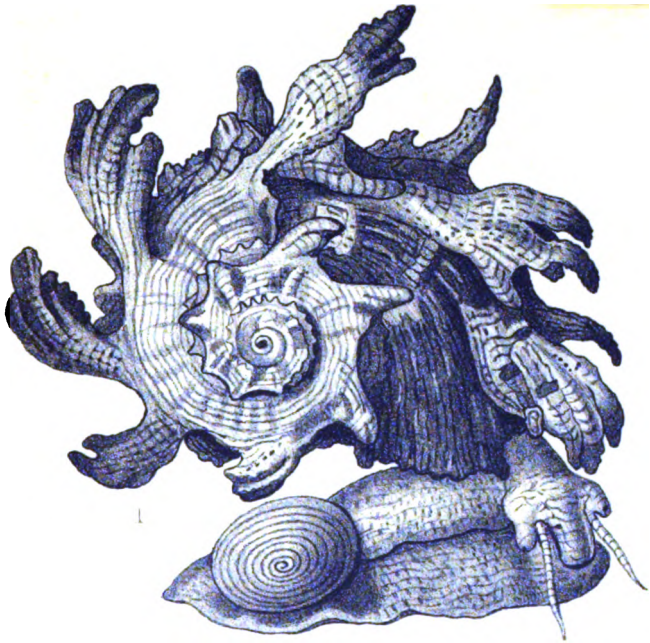

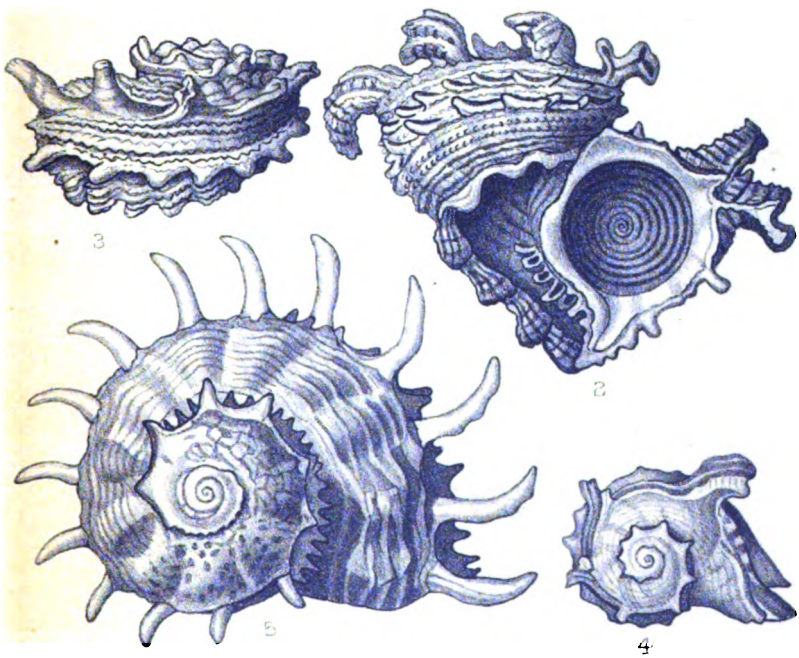

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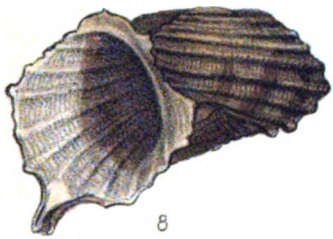

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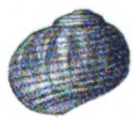

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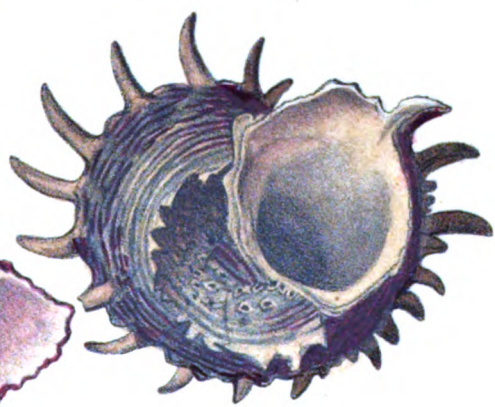

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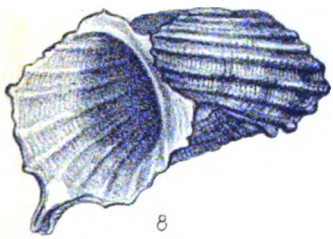

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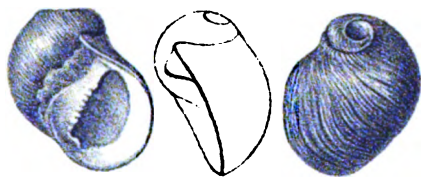

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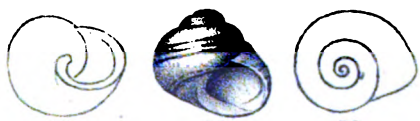

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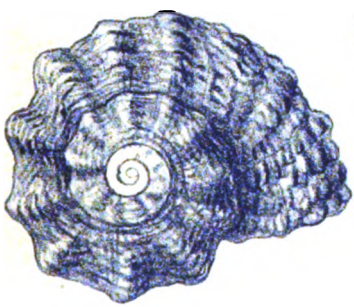

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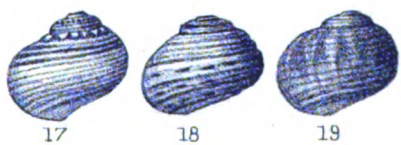

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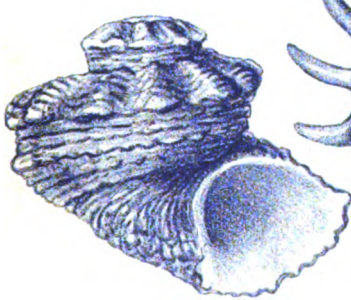

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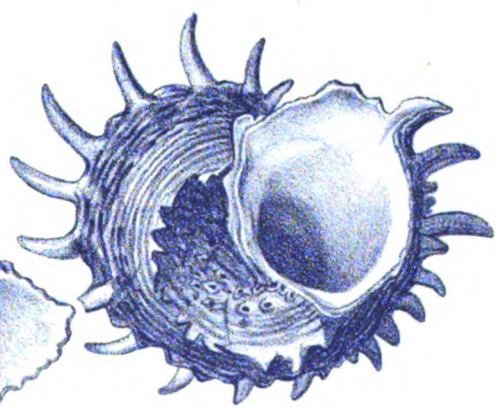

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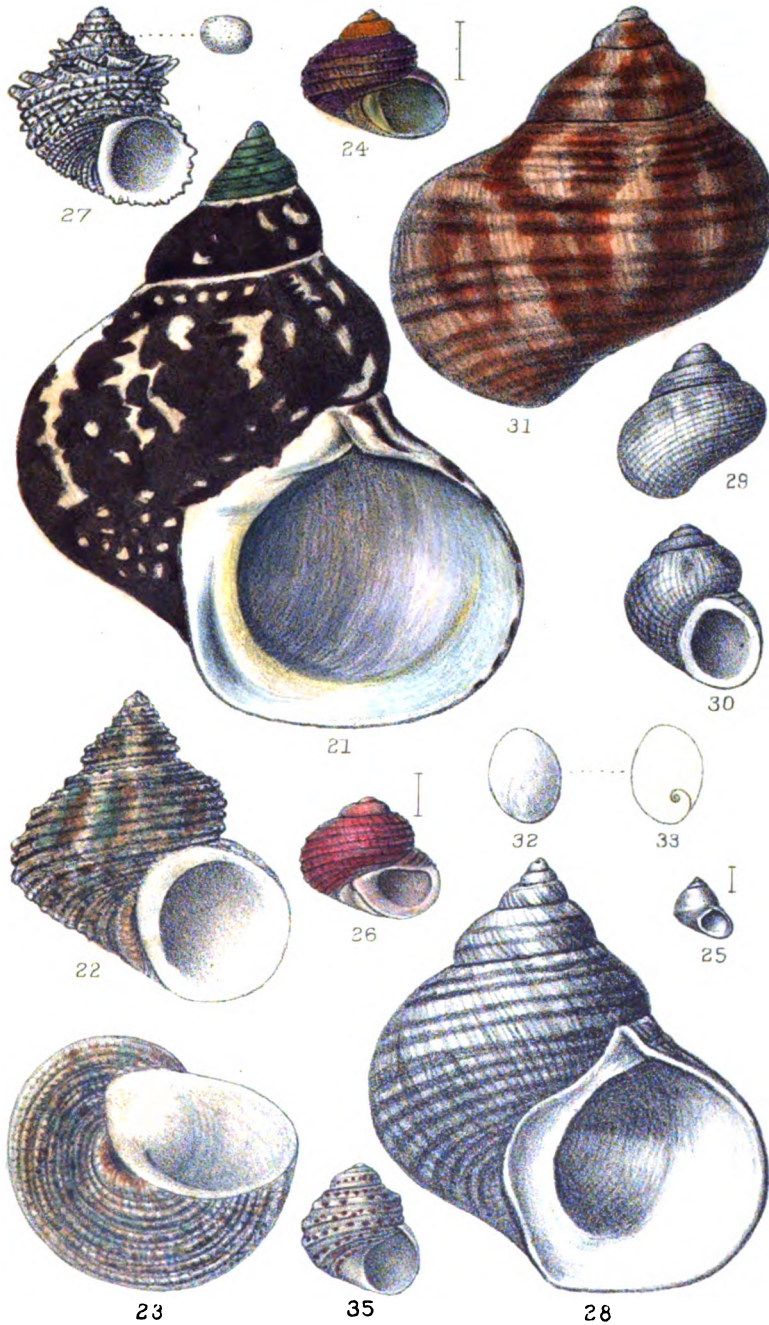

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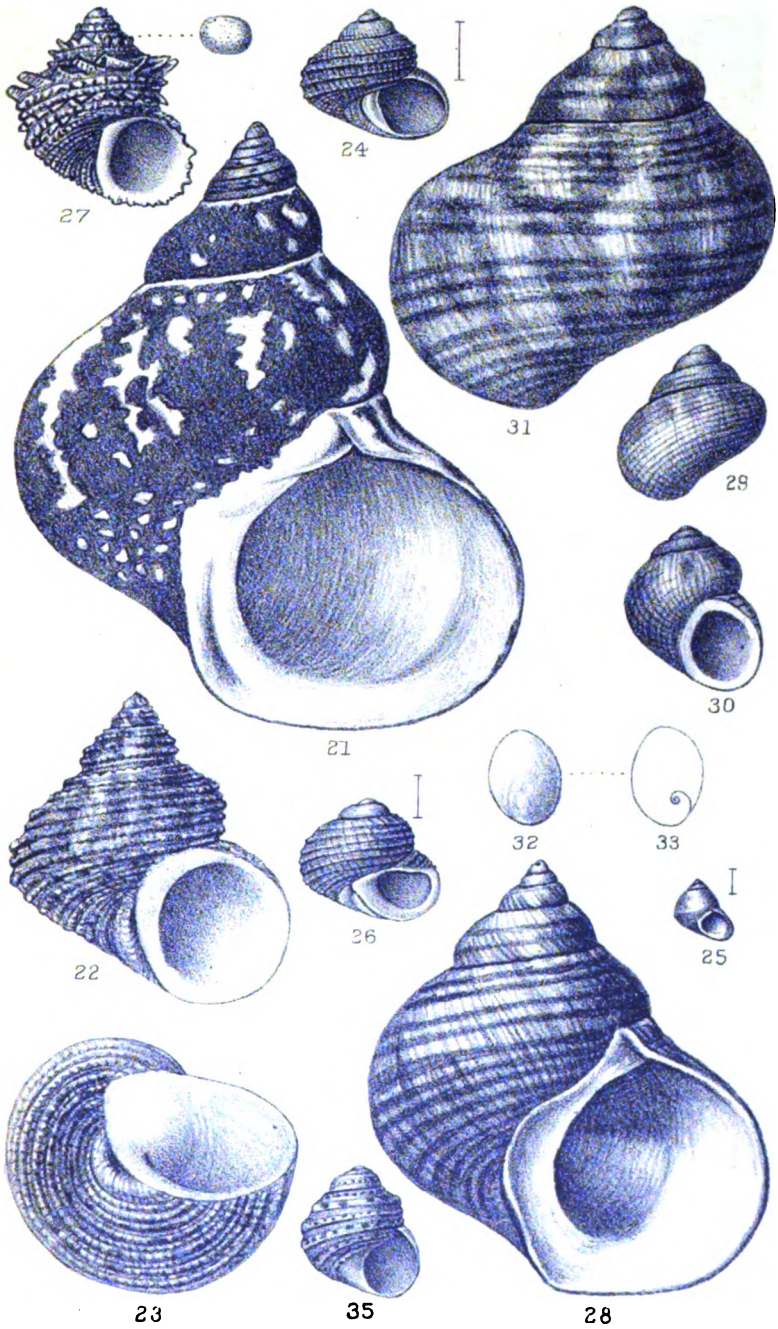

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MANUAL

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STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.
CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

Part.....

PHILADELPHIA:
Published by the Author,
ACADEMY OF NATURAL SCIENCES, COR 19TH & RACE STS.
1887.

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AN INTRODUCTION TO THE STUDY OF

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By GEORGE W. TRYON, Jr.

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